Comprehensive Review of the Rules for the Survey and Construction of Steel Ships Part B (Review of Rule Format)

Amended Rules and Guidance

Rules for the Survey and Construction of Steel Ships Part B
Guidance for the Survey and Construction of Steel Ships Part B

Reason for Amendment

The Society reviewed Part B as a part of comprehensive review of its Rules. As a result, it was confirmed that some of the annexes of Part B of the Guidance were originally intended to be annexes of Part B of the Rules instead. Because of this, the descriptions for some tables were not consistent and some sentences were not clear.

Accordingly, relevant requirements are amended as a result of the review.

Outline of Amendment

(1) Transfers annexes from Part B of the Guidance to Part B of the Rule.
(2) Unifies the description for some tables.
(3) Clarifies some sentences.

"Rules for the survey and construction of steel ships" has been partly amended as follows:

Part B CLASS SURVEYS

Chapter 2 CLASSIFICATION SURVEYS

2.1 Classification Survey during Construction

2.1.4 Presence of Surveyor*

Sub-paragraph -1 has been amended as follows.

1 The presence of the Surveyor is required at the following stages of the work in relation to hull and equipment. To implement surveys of items specified otherwise by the Society, in lieu of traditional ordinary surveys where the Surveyor is in attendance, the Society may approve other survey methods which it considers to be appropriate in the following cases.

((1) to (7) are omitted.)

(8) When performance tests are carried out on closing appliances of openings, remote control devices, steering gears, anchoring and mooring equipment, emergency towing arrangements, means of embarkation and disembarkation (specified in **23.8, Part C** or **21.8, Part CS**), fire fighting systems, piping, water level detection and alarm systems (specified in **13.8.5** and **13.8.6, Part D**), dewatering arrangements (specified in **13.5.10, Part D**), etc. Performance tests for one detector of each group (for on-board function tests of fixed fire detection and alarm systems installed in machinery spaces specified in **7.4.1-1**, **Part R of the Rules**, refer to the test procedures shown in **Annex B2.1.4-1(3)(h)i)**).

((9) to (17) are omitted.)

Paragraph 2.1.5 has been amended as follows.

2.1.5 Hydrostatic Tests, Watertight Tests, and Relevant Tests*

In the Classification Survey during Construction, hydrostatic tests, watertight tests, and other relevant tests are to be carried out in accordance with the following:

(1) Hull and equipment

The watertightness and the structural adequacy of tanks and watertight boundaries as well as the weathertightness of other structures and shipboard outfittings are to be verified by ~~tests deemed appropriate by the Society~~ following **(a)** and **(b)**.

(a) For ships subject to *SOLAS Convention*, the tests stipulated in *SOLAS Chapter II-1 Regulation 11*, except where specially approved by the Administration; and

(b) The tests stipulated in the following **i)** or **ii)**:

i) Testing procedures of watertight compartments for ships subject to *SOLAS Convention* (including ships subject to **Part CSR-B&T**) are to be carried out in accordance with **Chapter 1 of Annex 2.1.5 "Testing Procedures of Watertight Compartments"**, unless:

1) the shipyard provides documentary evidence of the shipowner's agreement to a request to the Flag Administration for an exemption from the application of *SOLAS Chapter II-1*, *Regulation 11*, or for an equivalency agreeing that the

content of **Chapter 2 of Annex B2.1.5-1 "Testing Procedures of Watertight Compartments"** is equivalent to *SOLAS Chapter II-1*, *Regulation 11*; and

2) the above-mentioned exemption/equivalency has been granted by the responsible Flag Administration.

ii) Testing procedures of watertight compartments are to be carried out in accordance with **Chapter 2 of Annex B2.1.5-1 "Testing Procedures of Watertight Compartments"** for ships not subject to *SOLAS Convention* and ships subject to *SOLAS Convention* (including ships subject to **Part CSR-B&T**) for which:

1) the shipyard provides documentary evidence of the shipowner's agreement to a request to the Flag Administration for an exemption from the application of *SOLAS Chapter II-1*, *Regulation 11*, or for an equivalency agreeing that the content of **Chapter 2 of Annex B2.1.5-1 "Testing Procedures of Watertight Compartments"** is equivalent to *SOLAS Chapter II-1*, *Regulation 11*; and

2) the above-mentioned exemption/equivalency has been granted by the responsible Flag Administration.

(2) (Omitted)

2.3 Sea Trials and Stability Experiments

2.3.1 Sea Trials*

Sub-paragraph -1 has been amended as follows.

1 In the Classification Survey of all ships, sea trials specified in following **(1)** to **(13)** are to be carried out in full load condition, in the calmest possible sea and weather condition and in deep unrestricted water. However, where sea trials cannot be carried out in full load condition, sea trials may be carried out in an appropriate loaded condition. The noise measurements specified in **(11)** are to be carried out at either the full load condition or the ballast condition.

(1) (Omitted)

(2) Astern test. The test is to be carried out in accordance with **(a)** and **(b)** below and the items regarding stopping ability specified in **An1.4.3, Annex 2.3.1-1** "Guidance for the Test of Ship Manoeuvrability" are to be measured.

(a) While the ship is running ahead at maximum speed, an order for full astern is issued and the reversing operation from ahead run to full astern run is carried out as quickly as possible.

(b) For ships that are unable to perform the test at maximum speed, the ship is to run ahead at not less than the speed specified in **An1.1.1-9, Annex 2.3.1-1** "Guidance for the Test of Ship Manoeuvrability". While the ship is at this speed, an order for full astern is issued and the reversing operation from ahead run to full astern run is carried out as quickly as possible.

In applying this provision, the tests are to be carried out from all control positions where there are multiple control positions for the reversing operation to astern run.

(3) (Omitted)

(4) Turning test. The tests are to be carried out in accordance with **(a)** and **(b)** below. The turning test of an individual ship may be dispensed with, provided that sufficient data is available from the turning test of a sister ship and subject to special approval by the Society.

(a) A ship is steered to the left or right at the maximum rudder angle (normally 35 *degrees*, however, where a special rudder is provided, a different rudder angle considered

appropriate by the Society) while running ahead at the maximum speed, and this rudder angle is to be kept until the ship makes a 360 *degree* circle. The turning ability specified in **An1.4.2, Annex 2.3.1-1** "Guidance for the Test of Ship Manoeuvrability" is to be measured and the ship's stability during the turn is to be confirmed.

(b) Notwithstanding the requirements in **(1)**, for ships that are unable to perform the test at maximum speed, the ship is to run ahead at not less than the speed specified in **An1.1.1-9, Annex 2.3.1-1** "Guidance for the Test of Ship Manoeuvrability". While the ship is at this speed, the ship is steered to the left or right at the maximum rudder angle (normally 35 *degrees*, however, where a special rudder is provided, a different rudder angle considered appropriate by the Society), and this rudder angle is kept until the ship makes a 360-*degree* circle.

((5) to (10) are omitted.)

(11) Noise measurements. The measurements are to be in accordance with **Annex 2.3.1-2 "Procedures for on board Noise Measurements"**.

((11) and (12) are omitted.)

2.3.2 Stability Experiments*

Sub-paragraph -1 has been amended as follows.

1 In the Classification Survey, stability experiments are to be carried out upon completion of the ship. The lightship displacement and the longitudinal, transverse and vertical position of its centre of gravity are to be determined. In addition, a stability information booklet, which is to be prepared on the basis of the particulars of stability determined by the results of stability experiments and to be approved by the Society, is to be provided on board. **Annex 2.3.2** gives the standard method for inclining tests.

Chapter 3 ANNUAL SURVEYS

Table B3.1 has been amended as follows.

Table B3.1 Examination of Plans and Documents

Items	Examination
1 Loading Manual	(1) For ships required to have the manual on board in accordance with the requirements of **34.1.1** and **34.3.1, Part C**, and **25.1.1, Part CS**, confirmation that the manual is kept on board is to be made.
2 Stability Information Booklet	(1) Confirmation as to whether the booklet is kept on board is to be made.
3 Damage Control Plan, Booklet and Damage Stability Information	(1) For ships required to have the damage control plan on board in accordance with the requirement in **Chapter 33, Part C**, confirmation that the approved plan is exhibited and the booklet containing the information shown in the plan and the damage stability information are kept on board is to be made.
4 Fire Control Plan	(1) Confirmation that the fire control plan is exhibited and properly stored is to be made.
5 Operating and Maintenance Manual for the door and inner door and notices indicating procedures for closing and securing	(1) For ships required to have the manual and notices on board in accordance with the requirements in **Chapter 23, Part C**, and **Chapter 21, Part CS**; (2) Confirmation that the manual is kept on board is to be made. (3) Confirmation that the board is exhibited is to be made.
6 Instruction Manuals for the Inert Gas System	(1) For ships required to have the manual on board in accordance with the requirements of **4.5.5, Part R**, confirmation that the manual is kept on board is to be made.
7 Towing and Mooring Fitting Arrangement Plan	(1) Confirmation that the Towing and Mooring Fitting Arrangement Plan specified in **27.2, Part C** or **23.2, Part CS** is kept on board is to be made.
8 Ship Structure Access Manual	(1) For ships required to have the manual on board in accordance with the requirements of **35.2.6, Part C** or **26.2.6, Part CS**, confirmation that the manual is kept on board and updated as necessary is to be made.
9 Documents related to the surveys for bulk carriers, oil tankers and ships carrying dangerous chemicals in bulk with integral tanks	(1) Confirmation that the documents are kept on board is to be made.
10 Coating Technical File and/or Corrosion Resistant Steel Technical File	(1) For ships required to have a Coating Technical File for dedicated seawater ballast tanks, etc. on board in accordance with the requirements of **25.2.2, Part C**, **22.4.2, Part CS**, **1.2.2 Section 5 Chapter 3, Part CSR-B** or **2.1.1.2 Section 6, Part CSR-T**, confirmation that the file is kept on board and that maintenance and repair work are properly recorded and kept on the file is to be made. (2) For ships required to have a Coating Technical File and/or a Corrosion Resistant Steel Technical File for cargo oil tanks on board in accordance with the requirements of **25.2.3, Part C** or **22.4.3, Part CS**, confirmation that the files are kept on board and that maintenance and repair work are properly recorded and kept on the files is to be made.
11 Noise survey report	(1) Confirmation that the report is kept on board

Table B3.1 Examination of Plans and Documents (Continued)

Items	Examination
12 Polar Water Operational Manual	—(1) For ships required to have the manual on board in accordance with the requirements of **2.3.1**, **Part I**, confirmation that the manual is kept on board is to be made.
13 Drawings indicating critical structural areas, construction monitoring plan and all construction monitoring survey records	—(1) For ships affixed with the notation "*HCM*" or "*HCM-GBS*", confirmation that the documents are kept on board is to be made.
14 Watertight cable penetration register	—(1) Confirmation that the register is kept on board and updated as necessary is to be made.

Table B3.2 has been amended as follows.

Table B3.2 General Examination

Items	Examination
1 Shell plating 2 Weather deck plating	~~-~~(1) Confirmation that areas visible above the load waterline are in good condition.
3 Openings on deck and outside of the hull	-(1) Confirmation that the means of securing the weathertightness of cargo hatchways, other hatchways and other openings on the freeboard and superstructure decks are in good condition. -(2) Confirmation that the watertight integrity of the closures to any openings in the ship's side below the freeboard deck is in good condition. -(3) Confirmation that the side scuttles and deadlights are in good condition.
4 Casings of engine room	-(1) Confirmation that the following are in good condition: exposed engine casings and their openings; and skylights of the engine room and boiler room and their closing appliances.
5 Ventilators	-(1) Confirmation that the ventilators including their coamings and closing appliances are in good condition.
6 Air pipes and sounding pipes	-(1) Confirmation that the air pipes and sounding pipes including their coamings and closing appliances are in good condition. -(2) For closing appliances of air pipes, open up examinations may be required depending upon their condition.
7 Watertight bulkhead, superstructure end bulkhead and deckhouses	-(1) Confirmation that watertight doors, penetrations and stop valves on watertight bulkheads, and closing appliances of openings in deckhouses or companions protecting hatchways giving access to spaces below freeboard deck are in good condition. -(2) Confirmation that the superstructure end bulkheads and the openings therein are in good condition.
8 Load line marks	-(1) Confirmation that deck line and load line markings are appropriate.
9 Bulwark	-(1) Confirmation that bulwarks and the shutters of its freeing ports; and hinges and guard rails are in good condition.
10 Means of access	~~-~~(1) Confirmation that the guardrails, gangways, walkways and other means provided for the protection of the crew and means for safe passage of crew are in good condition.
11 Scuppers, inlets, other discharge pipes and valves	-(1) Confirmation that the scuppers, inlets and discharges including their valves are in good condition. -(2) Confirmation that the garbage chutes including their valves are in good condition.
12 Securing arrangement for on-deck timber	-(1) Confirmation that securing arrangement for on-deck timber including eye plates, lashing wires, etc. is in good condition regardless of timber freeboard markings.
13 Anchoring and mooring arrangement	-(1) Confirmation that the anchoring and mooring arrangements including their accessories are in good condition as far as can be seen. -(2) Confirmation that the means provided to minimize water ingress through the spurling pipes and chain lockers are in good condition.
14 Fire extinguishing arrangement	-(1) Confirmation that the fire extinguishing arrangement is in good condition and the fixed fire extinguishing system, semi-portable and portable fire extinguishers, firefighters' outfits, emergency fire pumps and the international shore connection are maintained in good order.
15 Fire protection arrangement and means of escape	-(1) Confirmation that no alteration has been made to these arrangements since the last survey. (This includes the confirmation that emergency escape breathing devices (EEBDs) are complete and in good condition.)
16 Sails and their accessories	-(1) Confirmation that sails and their accessories are in good condition. They are to be in place and ready for unfolding at the time of examination.

Table B3.2 General Examination (Continued)

Items	Examination
17 Towing and mooring fittings	—(1) Confirmation that the marks of Safe Towing Load (*TOW*) on towing fittings and Safe Working Load (*SWL*) on mooring fittings as specified in **27.2.2 or 27.2.3, Part C** or **23.2.2 or 23.2.3, Part CS** are clearly visible and these fittings are in good condition.
18 Loading computer	—(1) Confirmation that the computer of ships required to have one in accordance with the provisions of **34.1.1** and **34.3.2, Part C** is maintained in good order.
19 Ship Identification Number	—(1) Confirmation that the markings of the ship's identification number for ships required to be so marked are in good condition.
20 Means of embarkation and disembarkation	—(1) Confirmation that the means of embarkation and disembarkation are in good condition.
21 Bow doors, inner doors, side shell doors and stern doors	—(1) Confirmation that the bow doors, inner doors, side shell doors and stern doors are in good condition.
22 Hearing protectors	—(1) Confirmation that hearing protectors are in good condition
23 Portable gas detecting instruments	—(1) Confirmation that portable gas detecting instruments are in good condition. (This includes the confirmation of calibration records.)
24 Helicopter facilities	—(1) Confirmation that the helicopter facilities, such as helidecks, means of escape, fire-fighting appliances, helicopter refuelling and hanger facilities, are in good condition, and that operations manual is provided.
25 Special arrangements for carrying dangerous goods	—(1) Confirmation, when appropriate, that the special arrangements for carrying dangerous goods are in good condition. (This includes the check of the electrical equipment and wiring, the ventilation, the provision of protective clothing and portable appliances.)
Additional Requirement for Tankers, Ships Carrying Dangerous Chemicals in bulk and Ships Carrying Liquefied Gases in bulk	
26 Piping	—(1) Confirmation that cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in cargo pump room, cargo compressor rooms and on weather decks are in good condition. —(2) Confirmation that the earthing between hull structures and cargo piping systems (cargo oil pipes, vent pipes, tank washing pipes, etc.) is in good condition.
27 Cargo tank	—(1) Confirmation that the cargo tank openings, including gaskets, covers, coamings and screens are in good condition. —(2) Confirmation that the cargo tank pressure/vacuum valves and devices to prevent the passage of flame are in good condition. —(3) Confirmation that the cargo tank venting, cargo tank purging and gas-freeing and other ventilation systems are in good condition. —(4) Confirmation that the earthing between hull structures and the cargo tank is in good condition.
28 Wire gauze to prevent the passage of flame	—(1) Confirmation, as far as practicable, that the wire gauze to prevent the passage of flame on vents to all bunker, oily-ballast and oily-slop tanks and void spaces are in good condition.
29 Safe access to the bow	—(1) Confirmation that the means of safe access to the bow is in good condition.
30 Emergency towing arrangements	—(1) Confirmation that emergency towing arrangements for ships of not less than 20,000 tonnes deadweight are in good condition.
Additional Requirement for Bulk Carriers over 10 *years* of age	
31 Piping in the cargo holds	—(1) Confirmation that all piping and penetrations in cargo holds, including overboard piping, are in good condition.
Additional Requirement for General Dry Cargo Ships of not less than 500 *gross tonnage* and over 15 *years* of age	
32 Piping in the cargo holds	—(1) Confirmation that all piping and penetrations in cargo holds, including overboard piping, are in good condition.

Table B3.2 General Examination (Continued)

Items	Examination
Additional Requirement for Container Carriers	
33 Block-to-block butt joints of strength decks and hatch side coamings (including top plates and attached longitudinal stiffeners)	(1) In the case of container carriers using extremely thick steel plates which comply with **32.13, Part C of the Rules**, it is to be confirmed, as far as practicable, that block-to-block butt joints of strength decks and hatch side coamings (including top plates and attached longitudinal stiffeners) are in good condition.

Note:
Examination of suspect areas identified at previous surveys is to be carried out.

Table B3.3 has been amended as follows.

Table B3.3 Performance Tests

Items	Tests
1 Weathertight hatch covers	~~(1)~~ Hose test (when deemed necessary by the Surveyor) ~~(2)~~ Random checking of the satisfactory operation of mechanically operated hatch covers including hydraulic and power components, wires, chains and link drives ~~(3)~~ For mechanically operated hatch covers on bulk carriers, hatch cover sets within the forward 0.25 L_f and at least one additional set, including hydraulic and power components, wires, chains and link drives, are to be checked for satisfactory operation so that all sets on the ship are checked at least once every 5 *years* between special surveys
2 Closing appliances of watertight door on watertight bulkheads and openings on superstructure end bulkheads, deckhouses or companions protecting hatchways giving access to spaces below freeboard deck	~~(1)~~ Checking whether the appliances work in good order is to be made as deemed necessary by the Surveyor. ~~(2)~~ Hose tests or equivalent tests are to be carried out. Such tests may be dispensed with at the discretion of the Surveyor.
3 Appliances related to fire protection and escape	~~(1)~~ Checking whether the appliances work in good order is to be carried out.
4 Fire detection system and fire alarm system including manually operated call points and sample extraction smoke detection system	~~(1)~~ Checking, as far as possible, whether the systems work in good order (including proper operation of malfunction indicator) is to be made.
5 Fire pumps (including emergency fire pumps) piping, hydrants, hoses, nozzles etc.	~~(1)~~ Performance test of the fire fighting system composed of fire pump, hydrants, etc. is to be carried out. For ships with fire pumps in periodically unattended machinery spaces, an operation test of the remote control system or automatic operation system of one pump is to be carried out.
6 Fixed deck foam system	~~(1)~~ Checking whether the system works in good order is to be carried out by delivering water.
7 Ventilation system	~~(1)~~ Checking whether the system works in good order is to be carried out.
8 Stability Computer	~~(1)~~ A performance test is to be carried out on computers for stability calculation that are installed as a supplement to the stability information booklet on board ships contracted for construction on or after 1 July 2005.
9 Water level detection and alarm systems	~~(1)~~ Checking whether the systems work in order is to be made at random.
10 Dewatering arrangements	~~(1)~~ Checking whether the systems work in order is to be made.
11 Bow doors, inner doors, side shell doors and stern doors	~~(1)~~ Checking whether the appliances work in good order is to be carried out. ~~(2)~~ Hose test (when deemed necessary by the Surveyor)
12 General emergency alarm system	~~(1)~~ Checking whether the system works in good order is to be carried out.
13 Special arrangements for carrying dangerous goods	~~(1)~~ Checking, when appropriate, whether the water supply, bilge pumping and any water spray system work in good order is to be carried out.

Table B3.3 Performance Tests (Continued)

Items	~~Tests~~
14 Portable gas detectors for vehicle carriers carrying motor vehicles with compressed hydrogen or natural gas in their tanks for their own propulsion as cargo	~~-~~(1) Checking whether the detectors work in good order is to be carried out.

Table B3.4 has been amended as follows.

Table B3.4 Internal Examinations of Spaces and Tanks

Items	Examination
Requirements for cargo ships except when specified otherwise	
1 Engine room and boiler room	—(1) An internal examination is to be carried out.
2 Cargo pump rooms, other pump rooms adjacent to cargo tanks, cargo compressor rooms and cargo pipe tunnels	—(1) An internal examination is to be carried out after the areas are thoroughly cleaned out and free of gas. Attention is to be paid to the bulkheads for signs of oil leakage or fractures (in particular, the sealing arrangements of all penetrations of bulkheads), ventilating arrangements, foundations and gland seals of pumps and compressors.
3 Ballast tanks	—(1) For ships over 5 *years* of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last intermediate Survey or special survey, is to be carried out.
Requirements for Tankers, Ships Carrying Dangerous Chemicals in bulk with integral tanks and Ships Carrying Liquefied Gases in bulk	
1 Engine room and boiler room	—(1) An internal examination is to be carried out.
2 Cargo pump rooms, other pump rooms adjacent to cargo tanks, cargo compressor rooms and cargo pipe tunnels	—(1) An internal examination is to be carried out after the areas are thoroughly cleaned out and free of gas. Attention is to be paid to the bulkheads for signs of oil leakage or fractures (in particular, the sealing arrangements of all penetrations of bulkheads), ventilating arrangements, foundations and gland seals of pumps and compressors.
3 Ballast tanks	—(1) For oil tankers, ships carrying dangerous chemicals in bulk and ships carrying liquefied gases in bulk over 5 *years* of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last intermediate Survey or special survey, is to be carried out.
Requirements for Bulk Carriers other than Double Skin Bulk Carriers[*1]	
1 Engine room and boiler room	—(1) An internal examination is to be carried out.
2 Ballast tanks	—(1) For bulk carriers over 5 *years* of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last Intermediate Survey or Special Survey, is to be carried out.
3 Cargo holds	—(1) For bulk carriers over 10 *years* of age, an internal examination of all cargo holds is to be carried out.
Requirements for Double Skin Bulk Carriers	
1 Engine room and boiler room	—(1) An internal examination is to be carried out.
2 Ballast tanks	—(1) For bulk carriers over 5 *years* of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last Intermediate Survey or Special Survey, is to be carried out.
3 Cargo holds	—(1) For bulk carriers over 10 *years* and up to 15 *years* of age, an internal examination of two selected cargo holds is to be carried out. —(2) For bulk carriers over 15 *years* of age, an internal examination of all cargo holds is to be carried out.

Table B3.4 Internal Examinations of Spaces and Tanks (Continued)

Items	Examination
Requirements for General Dry Cargo Ships of not less than 500 *gross tonnage*	
1 Engine room and boiler room	—(1) An internal examination is to be carried out.
2 Ballast tanks	—(1) For general dry cargo ships over 5 *years* of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last Intermediate Survey or Special Survey, is to be carried out.
3 Cargo holds	—(1) For general dry cargo ships carrying timber cargoes over 5 *years* and up to 10 *years* of age, an internal examination of all cargo holds is to be carried out to check the condition of lower part of hold frames, lower brackets and lower part of transverse bulkheads. —(1) For general dry cargo ships over 10 *years* and up to 15 *years* of age, an internal examination of one forward and one after cargo hold (all cargo holds for ships carrying timber cargoes) and their associated tween deck spaces is to be carried out. —(1) For general dry cargo ships over 15 *years* of age, an internal examination of all cargo holds and their associated tween deck spaces is to be carried out.

Note:

*1: For bulk carriers with hybrid cargo hold arrangements, e.g. with some cargo holds of single side skin and others of double side skin, the Requirements for Double Skin Bulk Carriers are to apply to cargo holds of double side skin and associated wing spaces.

Table B3.5 has been amended as follows.

Table B3.5 Close-up Surveys

Items	Examinations
Requirements for Cargo Ships except when specified otherwise	
1 Bow doors, inner doors, side shell doors and stern doors	~~-~~(1) Close-up surveys of securing, supporting and locking devices, together with welded parts, are to be carried out.
Requirements for Bulk Carriers other than Double Skin Bulk Carriers[*1]	
1 Hatch covers and hatch coamings	~~-~~(1) Close-up survey of hatch cover plating and hatch coaming plating and their stiffeners is to be carried out.
2 Structural members in cargo holds	~~-~~(1) For bulk carriers over 10 *years* but not more than 15 *years* of age, a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) is to be carried out, to establish the condition of the lower region of the side frames including approximately the lower one third length of the frames at side shell and side frame end attachment and the adjacent shell plating in the forward cargo hold. ~~-~~(2) For bulk carriers over 15 *years* of age, a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) is to be carried out, to establish the condition of the lower region of the shell frames including approximately the lower one third length of the frames at side shell and side frame end attachment and the adjacent shell plating in the forward cargo hold and one other selected cargo hold. ~~-~~(3) Where this level of survey reveals the need for remedial measures, the survey is to be extended to include a close-up survey of all of the shell frames and adjacent shell plating of that cargo hold as well as a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) of all remaining cargo holds
Requirements for Double Skin Bulk Carriers	
1 Hatch covers and hatch coamings	~~-~~(1) Close-up survey of hatch cover plating and hatch coaming plating and their stiffeners is to be carried out.
Requirements for General Dry Cargo Ships of not less than 500 *gross tonnage*	
1 Hatch covers and hatch coamings	~~-~~(1) Close-up survey of hatch cover plating and hatch coaming plating and their stiffeners is to be carried out.
2 Cargo hold frames	~~-~~(1) For general dry cargo ships carrying timber cargoes over 5 *years* and up to 15 *years* of age, the extent of survey is to be increased to the satisfaction of the Surveyor where deemed necessary by the Surveyor as a consequence of the survey carried out in accordance with **Table B3.4**. ~~-~~(2) For general dry cargo ships over 15 *years* of age, a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) is to be carried out, to establish the condition of the lower region of the shell frames including approximately the lower one third length of the frames at side shell and side frame end attachment and the adjacent shell plating in the forward cargo hold (the forward lower cargo hold in the case of tween deck spaces) and one other selected cargo hold (one other selected lower cargo hold in the case of tween deck spaces). ~~-~~(3) Where this level of survey reveals the need for remedial measures, the survey is to be extended to include a close-up survey of all of the shell frames and adjacent shell plating of those cargo holds and associated tween deck spaces (as applicable) as well as a close-up survey of sufficient extent of all remaining cargo holds and tween deck spaces (as applicable).

Note:

*1: For bulk carriers with hybrid cargo hold arrangements, e.g. with some cargo holds of single side skin and others of double side skin, the Requirements for Double Skin Bulk Carriers are to apply to cargo holds of double side skin and associated wing spaces.

Table B3.6 has been amended as follows.

Table B3.6 Thickness Measurements

Items	Note
Requirements for Cargo Ships except when specified otherwise	
1 Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in cargo pump rooms and cargo compressor rooms and on weather decks	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in **Table B3.2**, thickness measurements are to be carried out.
2 Structural members in ballast tanks	(1) When extensive corrosion is found in the examination specified in **Table B3.4** which is required for ships over 5 *years* of age, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of **5.2.6-2**.
3 Bow doors, inner doors, side shell doors and stern doors	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in **Table B3.2**, thickness measurements are to be carried out.
Requirements for Tankers, Ships Carrying Dangerous Chemicals in bulk with integral tanks and Ships Carrying Liquefied Gases in bulk	
1 Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in cargo pump rooms and cargo compressor rooms and on weather decks	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in **Table B3.2**, thickness measurements are to be carried out.
2 Structural members in ballast tanks	(1) When extensive corrosion is found in the examination of ballast tanks specified in **Table B3.4** which is required for oil tankers, ships carrying dangerous chemicals in bulk and ships carrying liquefied gases in bulk over 5 *years* of age, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of **5.2.6-3** or **-4**.
Requirements for Bulk Carriers	
1 Structural members in ballast tanks	(1) When extensive corrosion is found in the examination of ballast tanks specified in **Table B3.4** which is required for bulk carriers over 5 *years* of age, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of **5.2.6-5**.
2 Hatch covers and hatch coamings	(1) When deemed necessary by the Surveyor as a consequence of the internal examination required in **Table B3.4** or the close-up survey required in **Table B3.5**, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of **5.2.6-5**.
3 Structural members in cargo holds	

Table B3.6 Thickness Measurements (Continued)

Items	Note
Requirements for General Dry Cargo Ships of not less than 500 *gross tonnage*	
1 Structural members in ballast tanks	(1) When extensive corrosion is found in the examination of ballast tanks specified in **Table B3.4** which is required for general dry cargo ships over 5 *years* of age, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of **5.2.6-6**.
2 Hatch covers and hatch coamings	(1) When deemed necessary by the Surveyor as a consequence of the close-up survey required in **Table B3.5**, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of **5.2.6-6**.
3 Structural members in cargo holds	(1) For general dry cargo ships over 10 *years* of age, when deemed necessary by the Surveyor as a consequence of the internal examination required in **Table B3.4** and the close-up survey required in **Table B3.5**, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provisions of **5.2.6-6**.

Table B3.7 has been amended as follows.

Table B3.7 Performance Tests at Annual Surveys

Items	Examinations
1 Valves for oil tanks	(1) Operation tests for the arrangements for remote closing of valves for fuel oil tanks, lubricating oil tanks and other flammable oil tanks are to be carried out, as far as practicable and as appropriate.
2 Fuel oil pumps, cargo pumps, ventilating fans and boiler draught fans	(1) Operation tests for emergency stopping means are to be carried out.
3 Emergency electrical power source	(1) Operation tests for the emergency source of electrical power and its associated equipment are to be carried out in order to ascertain that the whole system is in good working order. Automatically operated equipment is to be tested in the automatic mode.
4 Communication systems	(1) Operation tests for the means of communication between the navigation bridge and the machinery control position and between the navigation bridge and the steering gear compartment are to be carried out.
5 Steering gears	(1) Performance tests are to be carried out for the main and auxiliary steering gears including their associated equipment and control systems;
6 Bilge systems	(1) Operation tests for the valves (including ones for emergency use), cocks, strainers, pumps, reach-rods and level alarms of the bilge systems are to be carried out.
7 Safety devices	**1** Operation tests for the safety devices, etc. specified in the following (~~a~~1) to (~~e~~5) are to be carried out. However, the tests may be omitted at the Surveyor's discretion based on the general examination, reports of working conditions at sea and inspection records taken by the ship's crew.
(~~a~~1) Main propulsion machinery and auxiliary machinery	(a) Operation tests of the following safety/alarm devices on prime movers of main propulsion machinery; electric generators; auxiliary machinery essential for propulsion; and auxiliary machinery for manoeuvring and crew safety are to be carried out. Where deemed necessary by the Surveyor, the maintenance records of the cooling water and lubricating oil are required to be presented for review. (~~i~~i) Overspeed protective devices (~~i~~ii) Automatic shut-off and alarm devices in case of loss or low pressure of the lubricating oil (~~i~~iii) Automatic shut-off devices in case of abnormally low pressure of the main condenser vacuum for steam turbines used as main propulsion machinery
(~~b~~2) Boilers, thermal oil heaters, incinerators and gas combustion units (*GCU*s)	(a) Operation tests for the safety devices, alarm devices and pressure indicators are to be carried out. Calibration records for the pressure indicators are to be ascertained and the relieving gears of the safety valves are to be examined and tested to verify satisfactory operation. However, the relief valves provided on the exhaust gas economizers are to be tested by the Chief Engineer at sea prior to the Annual Survey within the period specified in **1.1.3-1(1)**. This test is to be recorded in the logbook for review by the attending surveyor. Where deemed necessary by the Surveyor, the control records of the boiler water and thermal heater oil are required to be presented for review.
(~~c~~3) Monitoring devices	(a) Operation tests for pressure indicators, thermometers, ammeters, voltmeters and revolution meters are to be carried out.
(~~d~~4) Automatic control devices or remote control devices	(a) Operation tests for automatic and remote control devices of auxiliary machinery essential for propulsion, manoeuvring, and crew safety as well as the means of remotely controlling the propulsion machinery (including electric propulsion plants for electric propulsion ships) from the navigating bridge (including the control, monitoring, reporting, alert and safety actions) are to be carried out.

Table B3.7 Performance Tests at Annual Surveys (Continued)

Items	Examinations
(~~e~~5) Engineer's Alarm	(a) It is to be confirmed that the engineer's alarm is clearly audible in the engineers' accommodation.

Table B3.8 has been amended as follows.

Table B3.8 Additional Requirements for Tankers, Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk

Items	Examinations
1 Cargo pumps, bilge pumps, ballast pumps, stripping pumps and ventilators	(1) Operation tests for the remote control systems and shut-off devices of the pumps installed in cargo pump rooms are to be carried out.
2 Bilge systems	(1) Operation tests of the bilge systems installed in cargo pump rooms of tankers and ships carrying dangerous chemicals in bulk, including checking of bilge level monitoring devices and alarms, are to be carried out.
3 Level indicators	(1) Operation tests of level indicators used in cargo tanks are to be carried out.
4 Pressure indicators	(1) Operation tests of pressure indicators installed in cargo discharge lines are to be carried out.
5 Inert gas systems	(1) Inert gas systems installed in accordance with **4.5.5, Part R**, are to be subjected to the following general examinations and operation tests. After completion of these examinations and tests, when practicable, the proper operation of the inert gas system is to be checked. Other inert gas systems are to be examined as deemed appropriate by the Society. (a) Examining externally for any sign of gas or effluent leakage (b) Confirming the proper operation of both inert gas blowers (c) Observing the operation of the scrubber-room ventilation system (d) Checking the deck water seal for automatic filling and draining (e) Examining the operation of all remotely operated or automatically controlled valves and, in particular, the flue gas isolating valves (f) Observing a test of the interlocking feature of soot blowers (g) Observing that the gas pressure regulating valve automatically closes when the inert gas blowers are secured (h) Checking, as far as practicable, the following alarms and safety devices of the inert gas system using simulated conditions where necessary: i) High oxygen content of gas in the inert gas main ii) Low gas pressure in the inert gas main iii) Low pressure in the supply to the deck water seal iv) High temperature of gas in the inert gas main v) Low water pressure or low water-flow rate vi) Accuracy of portable and fixed oxygen-measuring equipment by means of calibration gas vii) High water level in the scrubber viii) Failure of the inert gas blowers ix) Failure of the power supply to the automatic control system for the gas regulating valve and to the instrumentation for continuous indication and permanent recording of pressure and oxygen content in the inert gas main x) Failure of the power supply to the instrumentation for continuous indication and permanent recording of pressure and oxygen content in the inert gas main xi) High pressure of gas in the inert gas main

Table B3.8 Additional Requirements for Tankers, Ships Carrying Liquefied Gases in Bulk and Ships Carrying Dangerous Chemicals in Bulk (Continued)

Items	Examinations
6 Gauging, detecting and alarming devices	(1) General examinations and operation tests for the following are to be carried out for tankers and ships carrying dangerous chemicals in bulk. Where tests under actual conditions are difficult, simulation tests or other suitable means may be used to confirm functionality. (a) For fixed and portable gas detecting instruments and their associated alarms, the following items, in particular, are to be examined: i) The provision of at least one portable instrument for measuring oxygen and one for measuring flammable vapour concentrations, together with a sufficient set of spares is to be checked, and it is to be confirmed that suitable means are provided for the calibration of these instruments. ii) The arrangements for gas measurement in double-hull spaces and double bottom spaces, including the fitting of permanent gas sampling lines are to be examined, where appropriate. iii) The fixed hydrocarbon gas detection system for measuring hydrocarbon gas concentrations in all ballast tanks and void spaces of double-hull and double-bottom spaces adjacent to the cargo tanks are to be examined and tested, as far as possible. iv) It is to be confirmed that the system for continuous monitoring of the concentration of flammable vapours in cargo pump room is satisfactory. v) It is to be confirmed that sampling points or detector heads of the system specified in iv) are located in suitable positions in order that potentially dangerous leakages are readily detected. (b) Gauging devices for oxygen density
7 Fire extinguishing arrangement	(1) For tankers, general examinations and operation tests for the following are to be carried out: (a) It is to be confirmed that the deck foam system, including the supplies of foam concentrate are in good condition. (b) It is to be checked that the two jets of water at the required pressure in the fire main is obtained when the system is in operation. (c) The fixed firefighting system for the cargo pump rooms are to be examined, and it is to be confirmed, as far as practicable and when appropriate, that the operation of the remote means for closing the various openings.

Table B3.9 has been amended as follows.

Table B3.9 Special Requirements for Ships Carrying Liquefied Gases in Bulk

Items	Examinations
1 Cargo containment system	(1) General condition of cargo tanks, secondary barriers and their insulation; and sealing arrangement for cargo tanks or tank covers penetrating decks is to be examined as far as accessible. At the first Annual Survey after delivery, examinations specified in 1(1)(a), (b) and 2 of Table B5.27 and an examination of the general condition of cargo tank foundations are to be carried out. However, these examinations may be dispensed with in accordance with the provisions specified otherwise by the Society.
2 Ventilating system for hold spaces and cargo containment system	(1) Pressure/Vacuum valves, safety systems and alarms, and their associated flame screens for cargo tanks, interbarrier spaces, and hold spaces, as well as the means for draining the vent pipes are to be examined generally as far as accessible to confirm that they are satisfactory. It is to be confirmed that the pressure relief valves for the cargo tanks are sealed and the relevant certificate for their opening/closing pressure is provided on board.
3 Cargo handling system	(1) The general condition of the equipment shown in (a) to (c) below is to be examined during operation, as far as is practical. Regarding (c), operation tests are also to be carried out. (a) Machinery for cargo handling including cargo heat exchangers, vaporizers, pumps and compressors. (b) Piping and its insulation for cargo handling system as far as accessible (c) ESD (emergency shutdown) systems for stopping cargo flow (performance tests are to be carried by manually activating emergency shutdown systems and confirming that cargo pumps and compressors automatically stop as a result.)
4 Gauging, detecting, safety, and alarming devices	(1) General examinations and performance tests of the following (a) to (i) are to be carried out. Where tests under actual conditions are difficult, simulation tests or other suitable means may be used to confirm functionality. (a) Liquid level gauges, high level alarms and valves associated with shut-off system (b) Liquid level indicators and overflow control for the cargo tanks (c) Temperature indication equipment and associated alarms (d) Pressure gauges, high pressure and, when applicable, low pressure alarms, for the cargo tanks (e) Pressure gauges and associated alarms for cargo tanks, interbarrier spaces and hold spaces (f) Arrangements for the cargo pressure/temperature control including, when fitted, any thermal oxidation systems, any refrigeration systems, and any associated safety measures and alarms (g) Fixed and portable gas detecting instruments and associated alarms (h) Gauging devices for oxygen density (i) Safety devices of the arrangements for the use of cargo as fuel
5 Environmental control system	(1) General examinations of the following (a) to (d) are to be carried out. (a) Gas free and purging systems for cargo tanks, arrangements for compensate for normal losses and atmosphere monitoring systems. (b) Confirmation that the use of inert gas has not increased beyond that needed to compensate for normal losses by examining records of inert gas usage (c) Confirmation that any air-drying system and any interbarrier and hold space purging inert gas system are satisfactory (d) Pressure control system for associated inert gas system components, means for preventing backflow of gases and monitoring system

Table B3.9 Special Requirements for Ships Carrying Liquefied Gases in Bulk (Continued)

Items	Examinations
6 Fire extinguishing arrangement	(1) In addition to the general examinations for arrangements for fire protection and fire extinction specified in **Chapter 11, Part N,** general examinations and operation tests for the following are to be carried out: (a) Proper operation of the remote means of starting one main fire pump is to be confirmed. (b) The fixed fire-fighting systems for enclosed cargo machinery spaces and enclosed cargo motor rooms located within cargo areas are to be examined. (c) The water spray system for cooling, fire protection and crew protection is to be examined. (d) The dry chemical powder fire-extinguishing system for the cargo area is to be examined. (e) The appropriate fire-extinguishing systems for the enclosed cargo machinery spaces for ships that are dedicated to the carriage of a restricted number of cargoes and the internal water spray systems for the turret compartments are to be examined. (f) It is to be confirmed that means of operation for arrangements specified in (b) to (e) are clearly marked. (g) Additional firefighters' outfits provided for flammable cargoes are to be examined. (h) Alarm devices for emergency escapes are to be examined.
7 Personnel protection	(1) General examination of the equipment shown in (a) to (d) is to be carried out in addition to performance tests of decontamination shower and eye wash. (a) Protection equipment (b) Safety equipment (c) Stretcher and medical first-aid equipment (d) The following equipment if required by the provisions of **Part N**: i) respiratory protection for emergency escape purpose ii) decontamination showers and an eye wash iii) shelter in emergency
8 Stability Instrument	(1) Functional tests are to be carried out on stability instruments fitted in accordance with the requirements of **2.2.3, Part N**.

Table B3.9 Special Requirements for Ships Carrying Liquefied Gases in Bulk (Continued)

Items	Examinations
9 Miscellaneous	(1) The general condition of the equipment shown in (a) to (p) is to be examined. The contents of items (j) and (k) are to be checked and confirmation that they are kept on board is to be made. Regarding the arrangements for ventilation systems of spaces in the cargo area specified in (c), operation tests are to be carried out. (a) Facilities associated with damage stability requirements such as cross flooding equipment and watertight doors, as far as accessible. Where it is difficult to carry out a general examination of cross flooding equipment, alternative examinations considered appropriate by the Society may be carried out instead. (b) Closing devices of windows, doors and other openings of the wheelhouse, superstructures, and deckhouses that are required to be gas/vapour-tight; and the arrangements for the air locks. (c) Arrangements for ventilation systems, including their spare fans or impellers, of enclosed spaces in the cargo area and spaces in the cargo area normally entered during cargo handling operations. (d) Fixed or portable trays or insulation that protects the deck located beneath the cargo hose connection against cargo leakage. (e) Gas-tight bulkhead penetrations including gas-tight shaft sealings, as far as accessible. (f) Heating arrangements of structural hull steel, as far as accessible. (g) Cargo hoses. (h) Bow and stern loading and unloading arrangements (in particular, the electrical equipment, firefighting arrangements and means of communication between the cargo control room and the shore location) and their related installations, emergency muster station and other equipment required for special cargoes. (i) Electrical installations in hazardous area. (j) Cargo log book, operational records and manuals related to cargo containment system and cargo handling system. (k) The *IMO Code* for gas carriers or the Rules incorporating the provisions of this *Code* (l) Cargo control room (m) Gas detection arrangements for cargo control rooms and the measures taken to exclude ignition sources where such spaces are classified as hazardous areas (n) The bilge, ballast and oil fuel arrangements specified in **3.7, Part N** (o) The wheelhouse doors and windows, sidescuttles and windows in superstructure and deckhouse ends in the cargo area (p) Cargo machinery spaces and turret compartments, including their escape routes

Table B3.10 has been amended as follows.

Table B3.10 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk

Items	Examinations
1 Weather deck	(1) The general condition of the following equipment shown in (a) to (d) is to be examined. (a) Sampling arrangements for cargoes from heating and cooling lines. (b) Wheelhouse doors and windows, sidescuttles and windows in superstructure and deckhouse ends facing the cargo area (c) Pump discharge pressure gauges provided outside the pump rooms. (d) Insulation of piping
2 Cargo pump room and cargo handling spaces	(1) General examinations of the following (a) to (f) are to be carried out. For the equipment shown in (a), operation tests are to be carried out on each. (a) Electrical and mechanical devices for remotely controlling cargo pumps and bilge system; and remote shut-off system (b) Personnel rescue arrangements in cargo pump room (c) Equipment for cargo separation (d) Ventilating system including spare fans or impellers for enclosed spaces and compartments in cargo area (e) System for flowback to land facilities of cargo liquid and its slop and vapour (f) Confirmation that potential sources of ignition in or near the cargo pump room are eliminated, such as loose gear, combustible materials, etc., that there are no signs of undue leakage and that access ladders are in a satisfactory condition
3 Environmental control system for cargo containments and surrounding spaces	(1) General examinations of the following (a) and (b) are to be carried out. (a) Confirmation that arrangements for sufficient gas to be carried or generated to compensate for normal losses, and that the means provided for monitoring ullage spaces, are satisfactory (b) Confirmation that arrangements are made for sufficient medium to be carried where drying agents are used on air inlets to cargo tanks
4 Gauging, gas detecting and alarming devices	(1) General examinations and performance tests of the following (a) to (d) are to be carried out. Where tests under actual conditions are difficult, simulation tests or other suitable means may be used to confirm functionality. (a) Liquid level gauges, high level alarms and valves associated with overflow control (b) Gauging devices for liquid level, temperature and pressure of cargo containment system and the associated alarming devices (c) Fixed and portable gas detecting instruments and the associate alarming devices i) It is to be confirmed that the required gas detection instruments are on board and arrangements have been made for the supply of the appropriate vapour detection tubes. (d) Gauging devices for oxygen density
5 Fire extinguishing arrangement	(1) In addition to the general examinations for arrangements for fire protection and fire extinction specified in **Chapter 11, Part S**, general examinations and operation tests for the following are to be carried out. (a) The fixed firefighting system for the cargo pump room and the deck foam system for the cargo area are to be examined. (b) It is to be confirmed that means of operation for arrangements specified in (a) are clearly marked. (c) It is to be confirmed that the condition of the portable fire extinguishing equipment for the cargoes to be carried in the cargo area is satisfactory. (d) Additional firefighters' outfits provided for flammable cargoes are to be examined. (e) Alarm devices for emergency escapes are to be examined.

Table B3.10 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk (Continued)

Items	Examinations
6 Personnel protection	(1) General examination of the following equipment shown in (a) to (e) is to be carried out. Performance tests of decontamination shower and eye wash are to be carried out. (a) Protection equipment and its condition of stowage (b) Safety equipment (c) Stretcher and medical first-aid equipment (including oxygen resuscitation equipment and antidotes for the cargoes actually carried to be on board) (d) Decontamination showers and an eye wash (e) Where deemed necessary, respiratory protection for emergency escape purpose, eye protection and these condition of stowage
7 Stability Instrument	(1) Functional tests are to be carried out on stability instruments fitted in accordance with the requirements of **2.2.3, Part S**.
8 Miscellaneous	(1) The general condition of the equipment shown in (a) to (m) is to be examined. Regarding (c) and (m), operation tests are also to be carried out. The contents of items (k) and (l) are to be checked and confirmation that they are kept on board is to be made. (a) Facilities associated with damage stability requirements such as cross flooding equipment and watertight doors, as far as accessible. Where it is difficult to carry out a general examination of cross flooding equipment, alternative examinations considered appropriate by the Society may be carried out instead. (b) Cargo sample storage arrangements (c) Bow and stern loading/unloading arrangements and their related installations. (Operation of the means of communication and the remote shut down for the cargo pumps are to be examined.) (d) Fixed or portable trays or insulation that protects the deck located beneath the cargo hose connection against cargo leakage. (e) Identification marks of pipe lines including pumps and valves (f) Cargo tank ventilating system and means for draining its pipes (g) Cargo hoses (h) Special arrangements in accordance with the special requirements for certain cargoes (i) Heating and cooling arrangement for cargoes (j) Electrical installations in gas dangerous spaces or zones. (k) Cargo log book, operational records and manuals related to cargo containment system and cargo handling system. (l) The *IMO Code* for chemical carriers or the Rules incorporating the provisions of this *Code* (m) The arrangements for the ventilation of spaces normally entered during cargo handling operations and other spaces in the cargo area

Table B3.11 has been amended as follows.

Table B3.11 Special Requirements for Ships Using Low-flashpoint Fuels

Items	Examinations
1 Fuel containment systems[*1]	(1) The following (a) to (i) are to be carried out, so far as applicable. (a) External examination of the storage tanks including secondary barrier if fitted and accessible (b) General examination of the fuel storage hold place (c) Internal examination of tank connection space (d) External examination of tank and relief valves (e) Verification of satisfactory operation of tank monitoring system (f) Examination and testing of installed bilge alarms and means of drainage of the compartment (g) Examination of the general condition of the thermal insulation of fuel storage tanks and secondary barriers as far as accessible (h) Examination of the general condition of the sealing arrangements for fuel storage tanks or tank covers penetrating decks as far as accessible (i) At the first Annual Survey after delivery, the examinations specified in (1)(a) and (b) of item 1 and item 2 of **Table B5.29** as well as an examination of the general condition of the fuel storage tank connection to the hull are to be carried out when deemed necessary by the Surveyor.
2 Pressure relief systems for fuel containment systems and fuel storage hold spaces	(1) Pressure relief valves, vacuum protection systems and safety systems for fuel storage tanks, interbarrier spaces, and fuel storage hold spaces, as well as their associated protection screens and vent piping are to be examined generally as far as accessible. It is to be confirmed that records of sealing of pressure relief valves for fuel storage tanks and their pressure setting are maintained on board.
3 Bunkering systems and fuel supply systems for low-flashpoint fuels[*1]	(1) The following (a) to (c) are to be carried out, so far as applicable. (a) Examination of bunkering stations and the fuel bunkering system, including liquid level gauges, high level alarms and valves associated with emergency shutdown systems (b) Examination of the fuel supply system (including fuel heat exchangers, vaporizers, pumps and compressors) under its working condition as far as practicable (c) Examination of automatic and manual stopping devices for fuel pumps and compressors
4 Fuel Handling Piping, Machinery and Equipment	(1) Piping and its insulation, hoses, emergency shut-down valves, remote operating valves, relief valves, machinery and equipment for fuel storage, fuel bunkering, and fuel supply such as venting, compressing, refrigerating, liquefying, heating, cooling or otherwise handling the fuel are to be examined, as far as practicable. Stopping of pumps and compressors upon emergency shut-down of the system is to be confirmed as far as practicable.

Table B3.11 Special Requirements for Ships Using Low-flashpoint Fuels (Continued)

Items	Examinations
5 Control, Monitoring and Safety Systems	~~(a)~~(1) General examinations and performance testing of those specified in the following ~~i)~~(a) to ~~iii)~~(c) are to be carried out. Simulation testing or other suitable methods may be used in cases where it is difficult to carry out testing under actual operating conditions. ~~i)~~(a)Temperature indication equipment and associated alarms ~~ii)~~(b) Pressure gauges and associated alarms for fuel tanks, interbarrier spaces and fuel storage hold spaces ~~iii)~~(c) Oxygen content meters ~~(b)~~(2) The following ~~i)~~(a) to ~~v)~~(e) are to be carried out. ~~i)~~(a)Gas detection equipment, including both fixed and portable instruments, and other leakage detection equipment in compartments containing fuel storage, fuel bunkering, and fuel supply equipment or components or associated systems, including indicators and alarms, is to be confirmed in satisfactory operating condition. Recalibration of the gas detection systems is to be verified in accordance with the manufacturers' recommendations. ~~ii)~~(b) Verification of the satisfactory operation of the control, monitoring and shutdown systems, including automatic shutdown systems, of the fuel supply and bunkering systems is to be carried out. General examinations and performance testing, simulation testing or other suitable methods in cases where it is difficult to carry out performance testing under actual operating conditions for liquid level gauges, high level alarms and valves associated with emergency shutdown systems for bunkering are to be carried out. ~~iii)~~(c) Testing of the remote and local closing of the installed main tank valve is to be carried out. ~~iv)~~(d) Testing of the remote and local closing of the master fuel valve for each engine compartment and verification of satisfactory operation of the fuel supply system control, monitoring and shut-down systems are to be carried out with the fuel supply system operating under its working condition as far as practicable. ~~v)~~(e) Operational test, as far as practicable, of the shutdown of *ESD* protected machinery spaces is to be carried out.
6 Environmental control systems	(1) Means for inerting specified in the following (a) to (c) is to be examined. (a) Systems for gas freeing and purging and gas sampling devices for fuel storage tanks (b) Inert gas generators and inert gas storage systems (c) Pressure control systems, means for preventing backflow of gases and monitoring systems for inert gas associated systems
7 Ventilating System	(1) Examination of the ventilation system, including portable ventilating equipment where fitted, is to be made for spaces containing fuel storage, fuel bunkering, and fuel supply units or components or associated systems, including air locks, tank connection spaces, *ESD*-protected machinery spaces, fuel preparation rooms including pump rooms and compressor rooms, fuel valve rooms, control rooms and spaces containing gas burning equipment as well as double pipes and ducts. Where alarms, such as differential pressure and loss of pressure alarms, are fitted, these should be operationally tested as far as practicable.
8 Fire-extinguishing arrangements	(1) General conditions of fire-fighting systems for enclosed hazardous areas and alarm devices for emergency escape are to be examined.

Table B3.11 Special Requirements for Ships Using Low-flashpoint Fuels (Continued)

Items	Examinations
9 Other	(1) General conditions of those specified in the following (a) to (k) are to be examined. Checking the contents of items (i) to (k) and confirmation that they are maintained on board are to be carried out. (a) Closing appliances for openings such as windows and doors of the wheelhouse, deckhouses and superstructures that are required to be capable of being closed; and the arrangements for the air locks (b) Portable and fixed drip trays and insulation for the protection of the ship's structure in the event of leakage (c) Fuel preparation rooms, including fuel pump and compressor rooms, and the sealing of shafts penetrating gas-tight bulkheads (d) Means for preventing excessive cooling of hull structures (e) Approved fuel hoses (f) Electrical bonding arrangements in hazardous areas, such as those between hull structures and fuel piping or fuel storage tanks, including bonding straps where fitted (g) Equipment specially required depending upon fuel type (h) Electrical equipment and bulkhead/deck penetrations including access openings in hazardous areas[*2] (i) Bunker delivery notes for low-flashpoint fuel delivered as well as the operational procedures (**17.2.2-3, Part GF**)[*3] and emergency procedures (**17.2.2-4, Part GF**) for ships using low-flashpoint fuels (j) The *IMO International Code of Safety for Ships using Gases or Other Low-flashpoint Fuels* (k) Logbooks/Records[*4]

Notes:

(*1) Insulation need not be removed, but any deterioration or evidence of dampness is to be investigated.

(*2) The electrical equipment and bulkhead/deck penetrations including access openings are to be examined for continued suitability for their intended service and installation area.

(*3) The manufacturer/builder instructions and manuals covering the operations, safety and maintenance requirements and occupational health hazards relevant to fuel storage, fuel bunkering, and fuel supply and associated systems for the use of the fuel, are to be confirmed as being aboard the vessel.

(*4) The logbooks and operating records are to be examined with regard to correct functioning of the gas detection systems, fuel supply/gas systems, etc. The hours per day of the reliquefaction plant, gas combustion unit, as applicable, the boil-off rate, and nitrogen consumption (for membrane containment systems) are to be considered together with gas detection records.

Chapter 4 INTERMEDIATE SURVEYS

Table B4.1 has been amended as follows.

Table B4.1 Performance Test

Items	Tests
1 Equipment or installations of items in **Table B3.3** (except item 2)	(1) Tests for each item specified in **Table B3.3** are to be carried out.
2 Doors on watertight bulkheads and closing appliances on superstructure end bulkheads, deckhouses or companions protecting hatchways giving access to spaces below freeboard deck	(1) Confirmation that the doors and closing appliances work in order is to be made. (2) Hose tests or equivalent tests are to be carried out. Such tests may be dispensed with at the discretion of the Surveyor.
3 Drainage, mooring and anchoring arrangements and their accessories	(1) Confirmation that the arrangements work in order is to be made. This check may be dispensed with at the discretion of the Surveyor.
4 Fixed dry-chemical powder fire fighting system	(1) Confirmation that the piping is maintained in good condition is made by delivering air through the pipes. Confirmation that monitors and hoses, and the remote control system and related automatic valves work in order is to be made. (2) Confirmation of quantity of starting or pressuring gases is to be made.
5 Water spray system	(1) Checking whether the system works in order is to be made by delivering water through the system. Checking of quantity of delivered water may be dispensed with.
6 Carbon dioxide extinguishing medium, halon extinguishing medium and dry chemical powder extinguishing medium	(1) Confirmation of quantity of media is to be made.
7 Fixed carbon dioxide fire fighting system and fixed halon fire fighting system	(1) Confirmation that piping is maintained in good condition is made by delivering air through the pipes. (2) Confirmation that system alarm works in order is to be made.
8 Fixed foam fire fighting system and fixed high expansion foam fire fighting system	(1) Confirmation that piping is maintained in good condition is to be carried out by delivering water through the pipes.
9 Fixed pressure water spraying fire fighting system	(1) Confirmation that the system works in order is to be made by delivering water through the system. (2) Confirmation that the system pump works in order is to be made.
10 Automatic sprinkler system	(1) Confirmation that the delivery alarm and pump work in order is to be made while fire detecting system is in operation.
11 Fixed Local Application Fire-fighting Systems	(1) Confirmation that the piping is to be made by delivering air through pipes. (2) Confirmation that the system alarm works in order is to be made. (3) Confirmation that the feed water pump and starting valve works in order is to be made.
12 Closing appliances of openings related to fire fighting in way of cargo holds	(1) Confirmation that closing appliances work in order is to be made.

Table B4.1 Performance Test (Continued)

Items	Tests
Additional Requirements for Bulk Carriers	
13 Mechanically operated hatch covers	—(1) Confirmation that hatch cover sets within the forward $0.25L_f$ and at least one additional set work in good order is to be carried out. The method is to be in a way that ensures all sets on the ship are checked at least once every 5 *years* between special surveys. —(2) Confirmation that all hatch covers work in good order is to be carried out for ships over 10 years of age.
14 Weathertight hatch covers	—(1) Hose tests or equivalent, for all hatch covers for ships over 10 *years* of age.
15 Water level detection and alarm systems	—(1) Confirmation that the systems work in order is to be made for ships over 10 *years* of age.

Table B4.2 has been amended as follows.

Table B4.2 Internal Examinations of Spaces and Tanks

Items	Examinations
Requirements for cargo ships unless specified otherwise	
1 Engine room and boiler room	~~=~~(1) An internal examination is to be carried out on all aspects.
2 Cargo pump rooms, other pump rooms adjacent to cargo tanks, cargo compressor rooms and cargo pipe tunnels	~~=~~(1) An internal examination is to be carried out after thoroughly cleaned out and gas freed. Attention is to be paid to the sealing arrangements of all penetrations of bulkheads, ventilating arrangements, foundations and gland seals of pumps and compressors.
3 Ballast tanks	~~-~~(1) For ships over 5 *years* and up to 10 *years* of age, an internal examination of representative ballast tanks is to be carried out. Where poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction, the examination is to be extended to other ballast tanks of the same type. ~~-~~(2) For ships over 10 *years* of age, an internal examination of all ballast tanks is to be carried out. ~~-~~(3) If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains effective. ~~-~~(4) For ballast tanks where a protective coating is found in poor condition, and it is not renewed or where a protective coating has not been applied, excluding double bottom tanks, an internal examination is to be carried out at annual intervals. For double bottom ballast tanks in this condition, where considered necessary by the Surveyor, an internal examination is to be carried out at annual intervals.
4 Cargo holds	~~-~~(1) For cargo ships over 10 *years* of age, excluding ships solely carrying dry cargoes, an internal examination of selected cargo holds is to be carried out. ~~-~~(2) For ships over 15 *years* of age, an internal examination of one forward cargo hold and one after cargo hold is to be carried out.

Note:

(1) "Representative ballast tanks" means ballast tanks which include, at least, fore and aft peak tanks and two deep tanks within the cargo length area.

Table B4.2 Internal Examinations of Spaces and Tanks (Continued)

Items	Examinations
Requirements for Tankers, Ships Carrying Dangerous Chemicals in bulk with integral tanks and Ships Carrying Liquefied Gases in bulk	
1 Engine room and boiler room	~~-~~(1) An internal examination is to be carried out on all aspects.
2 Cargo pump rooms, other pump rooms adjacent to cargo tanks, cargo compressor rooms and cargo pipe tunnels	~~-~~(1) An internal examination is to be carried out after thoroughly cleaned out and gas freed. Attention is to be paid to the sealing arrangements of all penetrations of bulkheads, ventilating arrangements, foundations and gland seals of pumps and compressors.
3 Ballast tanks	(1) For Oil Tankers and Ships Carrying Dangerous Chemicals in bulk: ~~-~~(a) For oil tankers and ships carrying dangerous chemicals in bulk over 5 *years* of age, an internal examination of the tank(s), of which an internal examination is required as a consequence of the last Intermediate Survey or Special Survey, is to be carried out. ~~-~~(b) For oil tankers and ships carrying dangerous chemicals in bulk over 5 *years* and up to 10 *years* of age, an internal examination of representative ballast tanks is to be carried out. For oil tankers except Double hull oil tankers, an internal examination of all ballast tanks is to be carried out. ~~-~~(c) If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains effective. ~~-~~(d) Where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction, the examination is to be extended to other ballast tanks of the same type. ~~-~~(e) As a result of internal examinations, ballast tanks with conditions shown in ~~(a)~~ i) to ~~(c)~~ iii) require an internal examination to be carried out at annual intervals. ~~(a)~~i) The protective coating is found to be in less than GOOD condition and it is not repaired to the satisfaction of the Surveyor ~~(b)~~ii) The protective coating has not been applied from the time of construction or only the soft coating has been applied (the examination is to be extended to other ballast tanks of the same type) ~~(c)~~iii) Substantial corrosion is found within the tanks (2) For Ships Carrying Liquefied Gases in bulk: ~~-~~(a) For ships over 5 *years* and up to 10 *years* of age, an internal examination of representative ballast tanks is to be carried out. ~~-~~(b) For ships over 10 *years* of age, an internal examination of all ballast tanks is to be carried out. ~~-~~(c) If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains effective. ~~-~~(d) For ballast tanks where a protective coating is found in poor condition, and it is not renewed or where a protective coating has not been applied, excluding double bottom tanks, an internal examination is to be carried out at annual intervals. For double bottom ballast tanks with the condition as specified, where considered necessary by the Surveyor, an internal examination is to be carried out at annual intervals.

Table B4.2 Internal Examinations of Spaces and Tanks (Continued)

Items	Examinations
Requirements for Bulk Carriers	
1 Engine room and boiler room	(1) An internal examination is to be carried out on all aspects.
2 Ballast tanks	(1) For bulk carriers over 5 *years* and up to 10 *years* of age, an internal examination of representative ballast tanks and combined cargo/ballast tanks, if any, is to be carried out. Where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction, the examination is to be extended to other ballast tanks of the same type. (2) If such examinations reveal no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains effective. (3) For ballast tanks where a protective coating is found in poor condition, and it is not renewed or where a protective coating has not been applied from the time of construction, excluding double bottom tanks, an internal examination is to be carried out at annual intervals. For double bottom ballast tanks in this condition, where considered necessary by the Surveyor, an internal examination is to be carried out at annual intervals.
3 Cargo holds	(1) For bulk carriers over 5 *years* of age, an internal examination of all cargo holds is to be carried out.
Requirements for General Dry Cargo Ships of not less than 500 *gross tonnage*	
1 Engine room and boiler room	(1) An internal examination is to be carried out on all aspects.
2 Ballast tanks	(1) Same as those for cargo ships
3 Cargo holds	(1) For general dry cargo ships over 5 *years* and up to 10 *years* of age, an internal examination of one forward and one after cargo hold (all cargo holds for ships carrying timber cargoes) and their associated tween deck spaces is to be carried out. (2) For general dry cargo ships over 10 *years* of age, an internal examination of all cargo holds and their associated tween deck spaces is to be carried out.

Note:

(1) "Representative ballast tanks" means ballast tanks which include, at least, fore and aft peak tanks and two (for double skin bulk carriers, three) deep tanks within the cargo length area.

Table B4.3 has been amended as follows.

Table B4.3 Close-up Surveys

Items	Examinations
Requirements for Cargo Ships except when specified otherwise	
1 Bow doors, inner doors, side shell doors and stern doors	~~-~~(1) Close-up surveys of securing, supporting and locking devices, together with welded parts, are to be carried out.
Requirements for Ships Carrying Liquefied Gases in bulk	
1 Ballast tanks	~~-~~(1) For ships over 10 *years* of age and up to 15 *years* of age, close-up surveys of the following portions are to be carried out: (~~1~~a) All web frames[*1] and both transverse bulkheads[*2] in a representative ballast tank (~~2~~b) The upper part of one web frame and one transverse bulkhead[*2] in another representative ballast tank ~~-~~(2) For ships over 15 *years* of age, close-up surveys of all web frames[*1] and both transverse bulkheads[*2] in two representative ballast tanks are to be carried out. ~~-~~(3) Notwithstanding the above, for ships having independent tanks of type *C*, with a midship section similar to that of a general cargo ship, the extent of close-up surveys may be reduced to a degree that is sufficient to confirm the actual average condition of the structure under the coating at the discretion of the Surveyor.
Requirements for Bulk Carriers other than Double Skin Bulk Carriers[*3]	
1 Hatch covers and hatch coamings	~~-~~(1) A close-up survey of all hatch cover plating and all hatch coaming plating and their stiffeners is to be carried out.
2 Structural members in cargo holds	
~~1~~**1** Hold frames including their upper and lower end attachments, adjacent shell plating	~~-~~(1) For ships over 5 *years* of age, a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) is to be carried out to establish the condition of shell frames including their upper and lower end attachments and adjacent shell plating in the forward cargo hold and one other selected cargo hold. Where considered necessary by the Surveyor as a result of the internal examination and close-up survey, the survey is to be extended to include a close-up survey of all of the shell frames and adjacent shell plating of that cargo hold as well as a close-up survey of sufficient extent (i.e. a minimum of 25% of the frames) of all remaining cargo holds. ~~-~~(2) A close-up survey is to be carried out to establish the condition of areas found to be suspect areas at previous surveys.
~~2~~**2** Transverse bulkheads	~~-~~(1) For ships over 5 *years* of age, a close-up survey is to be carried out to establish the condition of transverse bulkheads in the forward cargo hold and one other selected cargo hold. ~~-~~(2) A close-up survey is to be carried out to establish the condition of areas found to be suspect areas at previous surveys.
~~3~~**3** Other structural members	~~-~~(1) A close-up survey is to be carried out to establish the condition of areas found to be suspect areas at previous surveys. ~~-~~(2) Where considered necessary by the Surveyor as a result of the internal examination required in **Table B4.2**, a close-up survey is to be carried out.
3 Ballast tanks	~~-~~(1) A close-up survey is to be carried out to establish the condition of areas found to be suspect areas at previous surveys.
Requirements for Double Skin Bulk Carriers	
1 Hatch covers and hatch coamings	~~-~~(1) A close-up survey of all hatch cover plating and all hatch coaming plating and their stiffeners is to be carried out.
2 Structural members in cargo holds	~~-~~(1) Where considered necessary by the Surveyor as a result of the internal examination required in **Table B4.2**, a close-up survey is to be carried out.
3 Ballast tanks	~~-~~(1) A close-up survey is to be carried out to establish the condition of areas found to be suspect areas at previous surveys.

Table B4.3 Close-up Surveys (Continued)

Items	Examinations
Requirements for General Dry Cargo Ships of not less than 500 *gross tonnage*	
1 Hatch covers and hatch coamings	~~-~~(1) A close-up survey of hatch cover plating and hatch coaming plating and their stiffeners is to be carried out.
2 Structural members in cargo holds ~~1~~**1** Lower part of shell frames and their lower end brackets	~~-~~(1) For ships carrying timber cargoes over 5 *years* of age, a close-up survey of structures listed in the left column is to be carried out in all cargo holds.
~~2~~**2** Lower parts of transverse bulkheads	
~~3~~**3** Lower parts (located on inner bottom plating) of pipes that pass through cargo holds such as air pipes, sounding pipes, etc.	

Notes:

*1: Including structural members adjacent to cross ties and/or transverse web frame rings, such as shell plating, longitudinal bulkheads, longitudinal stiffeners, brackets.

*2: Including vertical and horizontal girders and adjacent structural members, and adjacent longitudinal bulkhead structure.

*3: For bulk carriers with hybrid cargo hold arrangements, e.g. with some cargo holds of single side skin and others of double side skin, the Requirements for Double Skin Bulk Carriers are to apply to cargo holds of double side skin and associated wing spaces.

Table B4.4 has been amended as follows.

Table B4.4 Thickness Measurements

Items	Note
Requirements for Cargo Ships except those specified in the followings	
1 Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in cargo pump rooms and cargo compressor rooms and on weather decks	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in **4.2.2**, thickness measurements are to be carried out.
2 Structural members in ballast tanks	For cargo ships over 5 *years* of age (1) Where considered necessary by the Surveyor as a result of the survey specified in **Table B4.2**, thickness measurements are to be carried out at the discretion of the Surveyor, where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction. (2) Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provision of **5.2.6-2**.
3 Bow doors, inner doors, side shell doors and stern doors	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in **4.2.2**, thickness measurements are to be carried out.
Requirements for Tankers, Ships Carrying Dangerous Chemicals in bulk with integral tanks and Ships Carrying Liquefied Gases in bulk	
1 Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in cargo pump rooms and cargo compressor rooms and on weather decks	(1) When deemed necessary by the Surveyor as a consequence of the examination specified in **4.2.2**, thickness measurements are to be carried out.
2 Structural members in ballast tanks (for ships over 5 *years* of age)	(1) Where considered necessary by the Surveyor as a result of the survey specified in **Table B4.2**, thickness measurements are to be carried out at the discretion of the Surveyor, where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction. (2) If the results of thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of **5.2.6-3** or **-4**.
3 Structural members in cargo tanks	(1) For ships over 5 *years* of age (excluding ships carrying liquefied gases in bulk), if the results of thickness measurements specified in **4.2.6** indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of **5.2.6-3** or **-4**.

Table B4.4 Thickness Measurements (Continued)

Items	Note
Requirements for the Bulk Carriers over 5 *years* of age	
1 Structural members in ballast tanks	~~-~~(1) Thickness measurements of areas found to be suspect areas at previous surveys are to be carried out. ~~-~~(2) Where considered necessary by the Surveyor as a result of the survey specified in **Table B4.2**, thickness measurements are to be carried out at the discretion of the Surveyor, where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction. ~~-~~(3) If the results of thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of **5.2.6-5**. ~~-~~(4) In addition to the above, for bulk carriers built under **Part CSR-B** or **Part CSR-B&T**, identified substantial corrosion areas are to be in accordance with either the following **~~(1)~~(a)** or **~~(2)~~(b)**: ~~(1)~~(a) Be protected by coatings applied in accordance with coating manufacturer requirements and examined annually to confirm said coatings are still in good condition; or, ~~(2)~~(b) Have thickness measurements taken annually
2 Hatch covers and hatch coamings	~~-~~(1) Thickness measurements of areas found to be suspect areas at previous surveys are to be carried out. ~~-~~(2) Where considered necessary by the Surveyor as a result of the close-up survey of the bulk carriers specified in **Table B4.3**, thickness measurements are to be carried out at the discretion of the Surveyor. If the results of thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of **5.2.6-5**. ~~-~~(3) In addition to the above, for bulk carriers built under **Part CSR-B** or **Part CSR-B&T**, identified substantial corrosion areas are to be in accordance with either the following **~~(1)~~(a)** or **~~(2)~~(b)**: ~~(1)~~(a) Be protected by coatings applied in accordance with coating manufacturer requirements and examined annually to confirm said coatings are still in good condition; or, ~~(2)~~(b) Have thickness measurements taken annually
3 Structural members in cargo holds	~~-~~(1) Thickness measurements of areas found to be suspect areas at previous surveys are to be carried out. ~~-~~(2) Thickness measurements are to be carried out to an extent that determines both general and local corrosion levels at the area subject to close-up survey. ~~-~~(3) The thickness measurements may be reduced to a degree that is sufficient to confirm the actual average condition of the structure under the coating provided the Surveyor is satisfied by the results of the close-up survey: that there is no structural diminution and the protective coating is found to be in a good condition. ~~-~~(4) If the results of thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of **5.2.6-5**. ~~-~~(5) In addition to the above, for bulk carriers built under **Part CSR-B** or **Part CSR-B&T**, identified substantial corrosion areas are to be in accordance with either the following **~~(1)~~(a)** or **~~(2)~~(b)**: ~~(1)~~(a) Be protected by coatings applied in accordance with coating manufacturer requirements and examined annually to confirm said coatings are still in good condition; or, ~~(2)~~(b) Have thickness measurements taken annually

Table B4.4 Thickness Measurements (Continued)

Items	Note
Requirements for General Dry Cargo Ships of not less than 500 *gross tonnage*	
1 Structural members in ballast tanks	~~-~~(1) Where considered necessary by the Surveyor as a result of the survey specified in **Table B4.2**, thickness measurements are to be carried out at the discretion of the Surveyor, where a poor coating condition, corrosion or other defects are found in a ballast tank or where a protective coating has not been applied from the time of construction. ~~-~~(2) If the results of thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements is to be increased in accordance with the provision of **5.2.6-6**.
2 Hatch covers and hatch coamings	~~-~~(1) When deemed necessary by the Surveyor as a consequence of the close-up survey required in **Table B4.3**, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provision of **5.2.6-6**.
3 Structural members in cargo holds	(1) For ships carrying timber cargoes over 5 *years* of age ~~-~~(a) Thickness measurements of structural members that were subject to close-up survey in all cargo holds is to be carried out to the same extent as the previous Special Survey. ~~-~~(b) The thickness measurements may be reduced to a degree that is sufficient to confirm the actual average condition of the structure under the coating provided the Surveyor is satisfied by the results of the close-up survey: that there is no structural diminution and the protective coating remains effective. (2) For general dry cargo ships over 10 *years* of age (excluding ships carrying timber cargoes) ~~-~~(a) When deemed necessary by the Surveyor as a consequence of the internal examination required in **Table B4.2**, thickness measurements are to be carried out to the satisfaction of the Surveyor. Where substantial corrosion is found, additional thickness measurements are to be carried out according to the provision of **5.2.6-6**.

Table B4.5 has been amended as follows.

Table B4.5 Additional Requirements at Intermediate Surveys

Items	Examinations
1 Refrigerating Machinery	(1) Examination of refrigerant leakage while the machinery is in operation and the general condition of the safety devices are to be carried out.
Requirements for Tankers	
1 Electrical installations in hazardous areas	~~(a)~~(1) Electrical installations in hazardous areas are to be examined in detail and confirmation that they conform to the requirements in **4.2.7**, **Part H** is to be carried out. In addition, confirmation that the installations are in good condition is to be made by measuring the insulation resistance. However, this measurement may be omitted at the discretion of the Surveyor, if accurate measurement records of the insulation resistance can be verified. ~~(b)~~(2) Performance tests of interlock devices associated with pressurized protected type electrical equipment and electrical equipment installed in pressurized or ventilated areas are to be carried out.

Table B4.6 has been amended as follows.

Table B4.6 Special Requirements for Ships Carrying Liquefied Gases in Bulk

Items	Examinations	
1 Piping of fixed gas detecting instruments	(1)	General examination is to be carried out.
2 Cargo tank pressure relief valves with non-metallic membranes	(1)	If the cargo tanks are equipped with relief valves with non-metallic membranes in the main or pilot valves, it is to be confirmed that such non-metallic membranes are maintained in good condition.
3 Electrical installations in hazardous areas	(1)	Examinations for tankers of **Table B4.5** are to be carried out.
4 Drainage system for leaked cargo	(1)	Performance test of drainage system for leaked cargo in interbarrier spaces and hold spaces is to be carried out.
5 Fire fighting system in enclosed gas dangerous spaces	(1)	Fixed piping is to be tested by passing air through it. Performance test of alarming devices for emergency escape is to be carried out.
6 Personnel Protection	(1)	Where air compressors are used with the safety equipment, performance tests of the air compressors are to be carried out.

Table B4.7 has been amended as follows.

Table B4.7 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk

Items	Examinations	
1 Electrical installations in hazardous areas	(1)	Examinations for tankers of **Table B4.5** are to be carried out.
2 Fire fighting system in enclosed gas dangerous spaces	(1)	Fixed piping is to be tested by passing air through it. Performance test of alarming devices for emergency escape is to be carried out.
3 Personnel Protection	(1)	Where air compressors are used with the safety equipment, performance tests of the air compressors are to be carried out.

Table B4.8 has been amended as follows.

Table B4.8 Special Requirements for Ships Using Low-flashpoint Fuels

Items	Examinations
1 Piping of gas detection systems	(1) General examinations are to be carried out.
2 Fuel storage tank pressure relief valves with non-metallic membranes	(1) In cases where fuel storage tank relief valves with non-metallic membranes are main or pilot valves, it is to be confirmed that such non-metallic membranes are maintained in good condition.
3 Electrical installations in hazardous areas	(1) Examinations for tankers of **Table B4.5** are to be carried out.
4 Bilge systems for interbarrier spaces, fuel storage hold spaces and tank connection spaces	(1) Performance testing of bilge systems is to be carried out.
5 Fire-fighting system in enclosed hazardous areas	(1) Fixed piping is to be tested by passing air through it.
6 Safety Systems	(1) Gas detectors, temperature sensors, pressure sensors, level indicators, and other equipment providing input to the fuel safety system are to be randomly tested to confirm satisfactory operating condition. Proper response of the fuel safety system upon fault conditions is to be verified.

Chapter 5 SPECIAL SURVEYS

5.2 Special Surveys for Hull, Equipment, Fire Extinction and Fittings

5.2.7 Pressure Tests*

Sub-paragraph -3 has been amended as follows.

3 At Special Surveys for oil tankers and ships carrying dangerous chemicals in bulk with integral tanks, notwithstanding the provisions of **-2** above, a pressure test is to be carried out for tanks listed in **Table B5.23-1**. With respect to the pressure tests for the cargo tanks of tankers and ships carrying dangerous chemicals in bulk, when pressure tests are conducted in the presence of the Master or any other representative personnel of the ship, such pressure tests may be regarded as the pressure tests required for Special Surveys at the discretion of the Surveyor provided the following **(1)** to **(5)** conditions are complied with. For pressure tests conducted in the presence of the master or any other representative personnel, guidance is specified in **Annex 5.2.7**. For double hull oil tankers and ships carrying dangerous chemicals in bulk with integral tanks, any testing of double bottom tanks and other watertight compartments not designed to carry liquids may be omitted, provided that satisfactory internal and/or external examinations are carried out.

(1) The procedure (including information such as fill heights, the tanks being filled and the bulkheads being tested) for the pressure test has been submitted by the owner and reviewed by the Society prior to the pressure test being carried out.

(2) There is no record of leakage, distortion or substantial corrosion that would affect the structural integrity of the tank.

(3) The pressure test has been satisfactorily carried out within special survey window not more than 3 months prior to the date of the survey on which the internal examination or close-up survey is completed.

(4) The satisfactory results of the pressure test are recorded in the ship’s logbook.

(5) The internal and external condition of the tanks and associated structure are found satisfactory by the Surveyor at the time of the internal examination and close-up survey.

Table B5.1 has been amended as follows.

Table B5.1 Internal Examinations of Tanks and Spaces

Special Survey	Tanks and spaces subject to examination
1 Special Survey for ships up to 5 *years* of age (Special Survey No. 1)	~~-~~(1) All tanks and spaces (other than cargo tanks of ships carrying liquefied gases in bulk), except for fuel oil tanks, lubricating oil tanks and fresh water tanks which are not peak tanks.
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No .2)	~~-~~(1) All tanks and spaces (other than cargo tanks of ships carrying liquefied gases in bulk as well as fuel oil tanks in engine rooms and lubricating oil tanks which are not peak tanks) However, if fuel oil tanks and fresh water tanks which are not peak tanks have had external examinations and the Surveyor is satisfied that they are in good condition, the scope of any internal examinations may be reduced. In such cases, internal examinations are to be carried out on the following tanks for at least the designated number of tanks: ~~(1)~~(a) Fuel oil tanks fitted within cargo length areas (within cargo areas for tankers): 1 tank ~~(2)~~(b) If no fuel oil tanks are fitted within cargo length areas (within cargo areas for tankers), fuel oil tanks fitted at locations other than engine rooms (if fitted): 1 tank ~~(3)~~(c) Fresh water tanks: 1 tank
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No. 3)	~~-~~(1) All tanks and spaces (other than cargo tanks of ships carrying liquefied gases in bulk and lubricating oil tanks which are not peak tanks) However, if fuel oil tanks which are not peak tanks have had external examinations and the Surveyor is satisfied that they are in good condition, the scope of any internal examinations may be reduced. In such cases, internal examinations are to be carried out on the following tanks for at least the designated number of tanks: ~~(1)~~(a) Fuel oil tanks fitted within engine rooms: 1 tank ~~(2)~~(b) Fuel oil tanks fitted within cargo length areas (within cargo areas for tankers): 2 tanks (In cases where deep fuel oil tanks are provided, one or more deep fuel oil tanks are to be included.) ~~(3)~~(c) If no fuel oil tanks are fitted within cargo length areas (within cargo areas for tankers), fuel oil tanks fitted at locations other than engine rooms (if fitted): 1 tank
4 Special Survey for ships over 15 *years* of age (Special Survey No. 4 and subsequent Special Surveys)	~~-~~(1) All tanks and spaces (other than cargo tanks of ships carrying liquefied gases in bulk) However, if fuel oil tanks and lubricating oil tanks which are not peak tanks have had external examinations and the Surveyor is satisfied that they are in good condition, the scope of any internal examinations may be reduced. In such cases, internal examinations are to be carried out on the following tanks for at least the designated numbers of tanks: ~~(1)~~(a) Fuel oil tanks fitted within engine room: 1 tank ~~(2)~~(b) Fuel oil tanks fitted within cargo length areas (for tankers, within cargo areas): half the total number of tank, but not less than 2 tanks. (in cases where deep fuel oil tanks are provided, one or more deep tanks are to be included.) ~~(3)~~(c) If no fuel oil tanks are fitted within cargo length areas (within cargo areas for tankers), fuel oil tanks fitted at location other than engine rooms (if fitted): 2 tanks ~~(4)~~(d) Lubricating oil tanks: 1 tank

Notes:

- Ballast tanks (excluding double bottom tanks) where the protective coating is found in poor condition and has not been renewed or where a protective coating has not been applied, internal examinations are to be carried out at annual intervals. For double bottom ballast tanks in this condition, internal examinations are to be carried out at annual intervals where considered necessary by the Surveyor.
- For holds insulated for the carriage of refrigerated cargo, limber boards and cover plates are to be removed and an examination of the inside is to be carried out. In addition, an examination behind the insulation is to be carried out at representative locations. The examination may be limited to verification that the protective coating remains effective and that there are no visible structural defects. Where the protective coating is found to be in a poor condition, the examination is to be extended as deemed necessary by the Surveyor.
- Ballast tanks converted to void spaces are to be examined in accordance with the provisions for ballast tanks.

Table B5.2 has been amended as follows.

Table B5.2 Additional Requirements of Internal Examinations for Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks

Special Survey	Tanks and spaces subject to examination	Notes
1 All Special Surveys	~~1~~ 1 All cargo tanks	~~-~~ (1) For oil tankers, combined cargo/ballast tanks, if any, are to be examined carefully taking account of ballast history and the extent of the corrosion prevention system provided. ~~-~~ (2) For oil tankers, condition of the inner surface of the bottom plating of the tank is to be examined carefully in order to ascertain that the there is no excessive pitting of the plating. ~~-~~ (3) For oil tankers, bell mouths of the cargo suction pipes are to be removed and the bottom plating of the tank and bulkheads in that vicinity are to be examined as considered necessary by the Surveyor.
	~~2~~ 2 All ballast tanks and pump rooms	~~-~~ (1) As a result of internal examinations, ballast tanks with conditions shown in (a) to (c) require an internal examination to be carried out at annual intervals. (a) The protective coating is found to be in less than GOOD condition and is not repaired to the satisfaction of the Surveyor. (b) The protective coating has not been applied from the time of construction or the soft coating has been applied (the examination is to be extended to other ballast tanks of the same type) (c) Substantial corrosion is found within the tanks ~~-~~ (2) An internal examination of the pump room is to be carried out carefully paying attention to the sealing arrangements of all penetrations of bulkheads, ventilating arrangements, foundations and gland seals of pumps.

Table B5.5-1 has been amended as follows.

Table B5.5-1 Requirements of Close-up Surveys for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks

Special Survey	Structural members subject to the Close-up Survey
Requirements for Tankers and Ships Carrying Dangerous Chemicals in bulk without Double Hull Structure	
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) One Web Frame (A) - in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast ~~2.~~(2) One Deck Transverse (B) - in a cargo tank or on deck ~~3.~~(3) The lower part of one Transverse Bulkhead (D) - in a ballast tank ~~4.~~(4) The lower part of one Transverse Bulkhead (D) - in a cargo wing tank ~~5.~~(5) The lower part of one Transverse Bulkhead (D) - in a cargo centre tank
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) All Web Frames (A) - in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast ~~2.~~(2) One Deck Transverse (B) - in or on each of the remaining ballast tanks, if any ~~3.~~(3) One Deck Transverse (B) - in or on a cargo wing tank ~~4.~~(4) One Deck Transverse (B) - in or on two cargo centre tanks ~~5.~~(5) Both Transverse Bulkheads (C) - in a ballast wing tank, if any, or a cargo wing tank used primarily for water ballast ~~6.~~(6) The lower part of one Transverse Bulkhead (D) - in each remaining ballast tank ~~7.~~(7) The lower part of one Transverse Bulkhead (D) - in a cargo wing tank ~~8.~~(8) The lower part of one Transverse Bulkhead (D) - in two cargo centre tanks
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) All Web Frames (A) - in all ballast tanks ~~2.~~(2) All Web Frames (A) - in a cargo wing tank ~~3.~~(3) A minimum of 30%[*1] of all Web Frames (A) - in each remaining cargo wing tank (only for oil tankers) ~~4.~~(4) One Web Frame (A) - in each remaining cargo tank (except for oil tankers) ~~5.~~(5) All Transverse Bulkheads (C) - in all cargo and ballast tanks ~~6.~~(6) A minimum of 30%[*1] of all Deck and Bottom Transverses (E) - in each cargo centre tank (only for oil tankers)
4 Special Survey for ships over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	(1) As Special Survey No.3. Additional transverses included as deemed necessary by the Surveyor.
Requirements for Tankers and Ships Carrying Dangerous Chemicals in bulk having Double Hull Structure	
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) One Web Frame (A) - in a ballast double hull tank[*2] ~~2.~~(2) One Deck Transverse (B) - in a cargo tank or on deck ~~3.~~(3) One Transverse Bulkhead (C) - in a ballast double hull tank[*2] ~~4.~~(4) The lower part of one Transverse Bulkhead (D) - in a cargo wing tank[*3] ~~5.~~(5) The lower part of one Transverse Bulkhead (D) - in a cargo centre tank
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) All Web Frames (A) - in a ballast double hull tank[*2] ~~2.~~(2) The knuckle area and the top part of one Web Frame (G) - in each remaining ballast tank ~~3.~~(3) One Deck Transverse (B) - in or on two cargo tanks ~~4.~~(4) One Transverse Bulkhead (C) - in all ballast double hull tanks[*2] ~~5.~~(5) The lower part of one Transverse Bulkhead (D) - in a cargo wing tank[*3] ~~6.~~(6) The lower part of one Transverse Bulkhead (D) - in two cargo centre tanks
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) All Web Frames (A) - in all ballast tanks ~~2.~~(2) All Web Frames (A) - in a cargo wing tank (or a cargo tank for oil tankers) ~~3.~~(3) One Web Frame (A) - in each remaining cargo tank ~~4.~~(4) All Transverse Bulkheads (C) - in all cargo and ballast tanks

Table B5.5-1 Requirements of Close-up Surveys for Oil tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks (Continued)

Special Survey	Structural members subject to the Close-up Survey
4 Special Survey for ships over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	(1) As Special Survey No.3. Additional transverses included as deemed necessary by the Surveyor.

Notes:

Letters in this table mean:

(A): Cross ties and complete transverse web frame ring including adjacent structural members such as shell plating, longitudinal bulkheads, longitudinal stiffeners, and brackets

(B): Including deck structural members adjacent to deck transverses such as deck plating, longitudinal stiffeners, and brackets

(C) and (D): Including vertical and horizontal girders and structural members adjacent to transverse bulkheads such as longitudinal bulkheads, inner bottom plating, hopper plating, bottom girders, brackets, and stiffeners; and internal structure of lower and upper stools, where fitted

(E): Including structural members adjacent to deck and bottom transverses such as deck plating, bottom plating, and longitudinal stiffeners

(F): Additional complete transverse web frame ring including adjacent structural members listed in A

(G): The knuckle area includes the slope hopper plating and where it connects to the inner hull bulkhead and inner bottom plating; up to 2 *meters* from the corners along the bulkhead and double bottom; and adjacent structural members

The top part includes the top 5 *meters* (3 *meters* for ships carrying dangerous chemicals in bulk) of the web frame and adjacent structural members

*1: The 30% is to be rounded up to the next whole integer

*2: "Ballast double hull tank" means the following, apart from the fore and aft peak tanks:

(a): all ballast compartments (hopper tank, side tank and double-deck tank, if separate from double-bottom tank) located on one side, i.e. portside or starboard side, and additionally double-bottom tank on portside plus starboard side, when the longitudinal central girder is not watertight and, therefore, the double bottom tank is a unique compartment from portside to starboard side; or

(b): all ballast compartments (double-bottom tank, hopper tank, side tank and double-deck tank) located on one side, i.e. portside or starboard side, when the longitudinal central girder is watertight and, therefore, the portside double-bottom tank separate from the starboard-side double-bottom tank.

*3: For double hull that have no centre cargo tanks (as in the case of tanks with a centre longitudinal bulkhead), transverse bulkheads in wing tanks are to be surveyed

Table B5.5-2 has been amended as follows.

Table B5.5-2 Requirements of Close-up Surveys for Ships Carrying Liquefied Gases in Bulk

Special Survey	Structural members subject to the Close-up Survey[*2]
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) One web frame in a representative ballast tank of the topside, hopper side and double hull side type (A) ~~2.~~(2) Lower part of one transverse bulkhead in a ballast tank[*1] (C)
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) All web frames in a ballast tank, which is to be a double hull side tank or a topside tank (If such tanks are not fitted another ballast tank is to be selected.[*1]) (A) ~~2.~~(2) One web frame in each remaining ballast tank (A) ~~3.~~(3) One transverse bulkhead in each ballast tank (B)
3 Special Survey for ships over 10 *years* of age (Special Survey No.3 and subsequent Special Surveys)	~~1.~~(1) All web frames in all ballast tanks (A) ~~2.~~(2) All transverse bulkheads in all ballast tanks (B)

Notes:

Letters in this table mean:

(A): Cross Ties and complete transverse web frame rings including adjacent structural members such as shell plating, longitudinal bulkheads, longitudinal stiffeners, brackets, etc.

(B): Including vertical and horizontal girders, adjacent structural members and adjacent longitudinal bulkhead structure

(C): Including vertical and horizontal girders and adjacent structural members

*1: One ballast tank can be selected from ballast tanks including peak tanks.

*2: For ships having independent tanks of type *C*, with a midship section similar to that of a general cargo ship, the extent of close-up surveys may be reduced to a degree that is sufficient to confirm the actual average condition of the structure under the coating at the discretion of the Surveyor.

Table B5.6-1 has been amended as follows.

Table B5.6-1 Requirements of Close-up Surveys for Bulk Carriers (Excluding Ore Carriers)

Special Survey	Structural members subject to Close-up Survey
Requirements for Bulk Carriers other than Double Skin Bulk Carriers[*1]	
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) A sufficient number (at least 1/4 of the total number) of shell frames at the forward, middle, and aft parts on both sides of forward cargo holds and selected frames in remaining cargo holds (A) ~~2.~~(2) Two selected cargo hold transverse bulkheads (including stiffeners and girders) (C) ~~3.~~(3) One transverse web with associated plating and longitudinals in two representative ballast tanks of each type (topside or bilge hopper tank) (B) ~~4.~~(4) Air pipes and sounding pipes in cargo holds in way of tank top ~~5.~~(5) All hatch cover plating, hatch coaming plating, and stiffeners
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) All shell frames in forward cargo hold and a sufficient number (at least 1/4 of the total number for ships less than 100,000 DWT and at least 1/2 of the total number for ships of 100,000 DWT or more) of shell frames in each of the remaining cargo holds including their end attachments and adjacent shell plating (A) ~~2.~~(2) All transverse bulkheads (including stiffeners and girders) in all cargo holds (C) ~~3.~~(3) One transverse web with associated plating and longitudinals in each ballast tank (B) ~~4.~~(4) Both forward and aft transverse bulkheads (including stiffeners and girders) in one ballast tank (B) ~~5.~~(5) All deck plating and under deck structure inside the line of hatch openings between cargo hold hatches ~~6.~~(6) All piping arrangements in cargo holds. If the surveyor considers it necessary, airtight tests are to be carried out. ~~7.~~(7) All hatch cover plating, hatch coaming plating, and stiffeners
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) All shell frames in the forward and one other selected cargo holds and a sufficient number (at least 1/2 of the total number) of shell frames in each of the remaining cargo holds including their end attachments and adjacent shell plating (A) ~~2.~~(2) All transverse bulkheads (including stiffeners and girders) in all cargo holds (C) ~~3.~~(3) All transverse webs with associated plating and longitudinals and all transverse bulkheads (including stiffeners and girders) in each ballast tank (B) ~~4.~~(4) Structural members specified in ~~5.~~(5) to ~~7.~~(7) of Special Survey No.2 above
4 Special Survey for ships over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) All shell frames in all cargo holds including their end attachments and adjacent shell plating (A) ~~2.~~(2) Structural members specified in ~~2.~~(2) to ~~4.~~(4) of Special Survey No.3 above
Requirements for Double Skin Bulk Carriers (excluding Ore Carriers)	
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) Two selected cargo hold transverse bulkheads (including stiffeners and girders) (C) ~~2.~~(2) One transverse web with associated plating and longitudinals in two representative ballast tanks of each type (this is to include the foremost topside and double side ballast tanks on either side) (B) ~~3.~~(3) Air pipes and sounding pipes in cargo holds in way of tank top ~~4.~~(4) All hatch cover plating, hatch coaming plating, and stiffeners

Table B5.6-1 Requirements of Close-up Surveys for Bulk Carriers (Excluding Ore Carriers) (Continued)

Special Survey	Structural members subject to Close-up Survey
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) One transverse bulkhead in each cargo hold (including stiffeners and girders) (C) ~~2.~~(2) One transverse web with associated plating and longitudinals in each ballast tank (B) ~~3.~~(3) Both forward and aft transverse bulkheads (including stiffeners and girders) in a transverse section including topside, bilge hopper and double side ballast tanks on one side of the ship (B) ~~4.~~(4) A sufficient number (at least 1/4 of total number) of stiffeners (ordinary transverse frames for transverse framing systems or longitudinals for longitudinal framing systems) on side shell and longitudinal bulkhead at forward, middle, and aft parts on both sides of the foremost double side tanks (A) ~~5.~~(5) All deck plating and under deck structure inside the line of hatch openings between cargo hold hatches ~~6.~~(6) All piping arrangements in cargo holds. If the surveyor considers it necessary, airtight tests are to be carried out. ~~7.~~(7) All hatch cover plating, hatch coaming plating, and stiffeners
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) All transverse bulkheads (including stiffeners and girders) in all cargo holds (C) ~~2.~~(2) All transverse webs with associated plating and longitudinals and all transverse bulkheads (including stiffeners and girders) in each ballast tank (B) ~~3.~~(3) A sufficient number (at least 1/4 of total number) of stiffeners (ordinary transverse frames for transverse framing systems or longitudinals for longitudinal framing systems) on side shell and longitudinal bulkhead at forward, middle, and aft parts on both sides of all double side tanks (A) ~~4.~~(4) Structural members specified in ~~5.~~(5) to ~~7.~~(7)of Special Survey No.2 above
4 Special Survey for ships over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) All stiffeners (ordinary transverse frames for transverse framing systems or longitudinals for longitudinal framing systems) on side shell and longitudinal bulkhead in all double side tanks (A) ~~2.~~(2) Structural members specified in ~~1.~~(1), ~~2.~~(2) and ~~4.~~(4) of Special Survey No.3 above

Notes:

(1) A double side tank of double skin bulk carriers is to be considered as a separate tank even if it is in connection to either the topside tank or the bilge hopper tank.

(2) Letters in this table mean:

(A): Cargo hold transverse frames, or stiffeners (ordinary transverse frames for transverse framing systems or longitudinals for longitudinal framing systems) on side shell or longitudinal bulkhead in double side tanks

(B): Transverse web or watertight transverse bulkhead in fore and aft peak, topside, bilge hopper, double side ballast tanks and double bottom tanks including adjacent structural members

(C): Including plating and internal structures of lower and upper stools, where fitted

(3) Close-up Surveys of transverse bulkheads are to be carried out at least at four levels as specified as follows:

(i) Immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool.

(ii) Immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates.

(iii) About mid-height of the bulkhead.

(iv) Immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks.

*1: For bulk carriers with hybrid cargo hold arrangements, that is, with some cargo holds of single side skin and others of double side skin, the Requirements for Double Skin Bulk Carriers are to apply to cargo holds of double side skin and associated wing spaces.

Table B5.6-2 has been amended as follows.

Table B5.6-2 Requirements of Close-up Surveys for Ore Carriers

Special Survey	Structural members subject to Close-up Survey
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) One web frame rings in a ballast wing tank (A) ~~2.~~(2) Lower part of one transverse bulkhead in a ballast tank (D) ~~3.~~(3) Two selected cargo hold transverse bulkheads (including stiffeners and girders) (E) ~~4.~~(4) Air pipes and sounding pipes in cargo holds in way of tank top ~~5.~~(5) All hatch cover plating, hatch coaming plating, and stiffeners
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) All web frame rings in a ballast wing tank (A) ~~2.~~(2) One deck transverse in each remaining ballast tank (B) ~~3.~~(3) Forward and aft transverse bulkheads in a ballast wing tank (C) ~~4.~~(4) Lower part of one transverse bulkhead in each remaining ballast tank (D) ~~5.~~(5) One transverse bulkhead in each cargo hold (including stiffeners and girders) (E) ~~6.~~(6) All deck plating and under deck structure inside line of hatch openings between cargo hold hatches ~~7.~~(7) All piping arrangements in cargo holds. If the surveyor considers it necessary, airtight tests are to be carried out. ~~8.~~(8) All hatch cover plating, hatch coaming plating, and stiffeners
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) All web frame rings in each ballast tank (A) ~~2.~~(2) All transverse bulkheads in each ballast tank (C) ~~3.~~(3) One web frame ring in all in each wing void space (A) However, additional close-up surveys may be carried out for other web frame rings in void spaces as deemed necessary by the Surveyor. ~~4.~~(4) All transverse bulkhead in each cargo hold (including stiffeners and girders) (E) ~~5.~~(5) Structural members specified in ~~6.~~(6). to ~~8.~~(8) of Special Survey No.2 above
4 Special Survey for ships over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) As for Special Survey No.3

Notes:

(1) Letters in this table mean:

(A): Cross Ties and complete transverse web frame rings including adjacent structural members such as shell plating, longitudinal bulkheads, longitudinal stiffeners, brackets, etc.

(B): Including deck structures adjacent to deck transverse such as deck plating, longitudinal stiffeners, brackets, etc.

(C) and (D): Including vertical and horizontal girders, and adjacent structural members such as longitudinal bulkheads, inner bottom plating, hopper plating, bottom girders, brackets, stiffeners, etc.

(E): Including plating and internal structures of lower and upper stools, where fitted

(2) Close-up Surveys of transverse bulkheads are to be carried out at least at four levels as specified as follows:

(i): Immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool.

(ii): Immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates.

(iii): About mid-height of the bulkhead.

(iv): Immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks.

Table B5.7 has been amended as follows.

Table B5.7 Requirements of Close-up Surveys for General Dry Cargo Ships of Not less than 500 *gross tonnage*

Special Survey	Structural members subject to Close-up Survey
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) Selected shell frames in one forward and one after cargo holds and associated tween deck spaces and lower part of remaining shell frames including their end attachments and adjacent shell plating ~~2.~~(2) Lower parts of shell frames in remaining cargo holds including their end attachments and adjacent shell plating ~~3.~~(3) One selected transverse bulkhead and lower part of remaining transverse bulkheads (including stiffeners and girders) ~~4.~~(4) Air pipes and sounding pipes in cargo holds in way of tank top ~~5.~~(5) All hatch cover plating, hatch coaming plating, and stiffeners
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) Selected shell frames in all cargo holds and associated tween deck spaces and lower part of remaining shell frames including their end attachments and adjacent shell plating ~~2.~~(2) One transverse bulkhead and lower part of the remaining transverse bulkhead in each cargo hold (including stiffeners and girders) ~~3.~~(3) Both forward and aft bulkhead (including stiffeners and girders) in one side ballast tank ~~4.~~(4) One transverse web with associated plating and longitudinals in two representative ballast tanks of each type (topside, bilge hopper, side tank or double bottom tank) ~~5.~~(5) Selected area of deck plating and under deck structure inside the line of hatch openings between cargo hatches ~~6.~~(6) Selected area of inner bottom plating ~~7.~~(7) Air pipes and sounding pipes in cargo holds in way of tank top ~~8.~~(8) All hatch cover plating, hatch coaming plating, and stiffeners
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) All shell frames in the forward cargo hold (the forward lower cargo hold in the case of tween deck spaces), and 25% of frames in each of the remaining cargo holds (tween deck spaces including the cargo holds except for the forward lower cargo hold in the case of tween deck spaces), and lower part of remaining shell frames including their end attachments and adjacent shell plating ~~2.~~(2) All transverse bulkheads (including stiffeners and girders) in all cargo holds ~~3.~~(3) All transverse bulkheads (including stiffeners and girders) in all ballast tanks ~~4.~~(4) All transverse webs with associated plating and longitudinals in each ballast tank ~~5.~~(5) All deck plating and under deck structure inside the line of hatch openings between cargo hold hatches ~~6.~~(6) All area of inner bottom plating ~~7.~~(7) Air pipes and sounding pipes in cargo holds in way of tank top ~~8.~~(8) All hatch cover plating, hatch coaming plating, and stiffeners
4 Special Survey for ships over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) All shell frames in all cargo holds and associated tween deck spaces including their end attachments and adjacent shell plating ~~2.~~(2) Structural members specified in ~~2.~~(2) to ~~8.~~(8) of Special Survey No.3 above

Notes:

Close-up Surveys of transverse bulkheads are to be carried out at least at three levels as specified as follows:

- Immediately above the inner bottom and immediately above the tween decks, as applicable.
- Mid-height of the bulkheads for holds without tween decks.
- Immediately below the upper deck plating and tween deck plating.

Table B5.8 has been amended as follows.

Table B5.8 Requirements for Thickness Measurements for Cargo Ships

Special Survey	Structural members subject to thickness measurement
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) Suspect areas ~~2.~~(2) All bow doors, inner doors, side shell doors and stern doors when deemed necessary by the Surveyor (plating and stiffeners)
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) Suspect areas ~~2.~~(2) Each plate in one section of the strength deck plating for the full beam of the ship within 0.5 *L* amidships ~~3.~~(3) All bow doors, inner doors, side shell doors and stern doors when deemed necessary by the Surveyor (plating and stiffeners)
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) Suspect areas ~~2.~~(2) Each plate and member in two transverse sections within 0.5 *L* amidships. (in way of two different cargo spaces, if applicable). When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~3.~~(3) Internals in fore and aft. peak ballast tank ~~4.~~(4) Both ends and middle part of each hatch side and end coaming (plating and stiffeners) ~~5.~~(5) All cargo hold hatch covers (plating and stiffeners) ~~6.~~(6) All bow doors, inner doors, side shell doors and stern doors when deemed necessary by the Surveyor (plating and stiffeners)
4 Special Survey for ships over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) Suspect areas ~~2.~~(2) Following portions of structural members: ~~(1)~~(a) All exposed main deck plates, full length ~~(2)~~(b) Each plate and member in three transverse sections of cargo areas within 0.5 *L* amidships. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~(3)~~(c) All wind and water strakes, port and starboard, full length ~~3.~~(3) Representative exposed superstructure deck plating (poop, bridge and forecastle deck) ~~4.~~(4) All keel plates, full length, and an appropriate number of bottom plates in way of cofferdams, machinery spaces and aft end of tanks ~~5.~~(5) Plating of sea chests, and shell plating in way of overboard discharges (as deemed necessary by the Surveyor) ~~6.~~(6) In all cargo holds, all lowest strakes and strakes in way of tween decks of all watertight transverse bulkheads in cargo spaces together with internals in way ~~7.~~(7) Structural members specified in ~~3.~~(3) to ~~6.~~(6) of Special Survey No.3

Table B5.9 has been amended as follows.

Table B5.9 Requirements of Additional Thickness Measurements for Cargo Ships in way of Substantial Corrosion

Structural Member	Extent of Measurement	Pattern of Measurement
1~~.~~ Plating	(1) Suspect areas and adjacent plates	5 point pattern over 1 *square metre*
2~~.~~ Girders	(1) Suspect areas	5 point pattern over 1 *square metre*
3~~.~~ Stiffeners	(1) Suspect areas	3 measurements in line across web 3 measurements on flange

Table B5.10-1 has been amended as follows.

Table B5.10-1 Requirements of Thickness Measurements for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks

Special Surveys	Structural members subject to thickness measurement
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) Suspect areas ~~2.~~(2) One section of deck plating for the full beam of the ship within the cargo area (in way of a ballast tank, if any, or a cargo tank used primarily for water ballast) ~~3.~~(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern ~~4.~~(4) Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in pump room and on weather decks, when deemed necessary by the Surveyor as a consequence of general examinations specified in **5.2.2**
2 Special Survey for ships over 5 years and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) Suspect areas ~~2.~~(2) Within the cargo area: ~~(1)~~(a) Each deck plate ~~(2)~~(b) One transverse section. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~3.~~(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern ~~4.~~(4) Selected wind and water strakes outside the cargo area ~~5.~~(5) Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in pump room and on weather decks, when deemed necessary by the Surveyor as a consequence of general examinations specified in **5.2.2**
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) Suspect areas ~~2.~~(2) Within the cargo area: ~~(1)~~(a) Each deck plate ~~(2)~~(b) Two transverse sections. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~3.~~(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern ~~4.~~(4) Selected wind and water strakes outside the cargo area ~~5.~~(5) All wind and water strakes within the cargo area ~~6.~~(6) Internals in fore and aft. peak ballast tank ~~7.~~(7) Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in pump room and on weather decks, when deemed necessary by the Surveyor as a consequence of general examinations specified in **5.2.2** ~~8.~~(8) For ships carrying dangerous chemicals in bulk, selected steel cargo pipes outside cargo tanks and ballast pipes passing through cargo tanks

Table B5.10-1 Requirements of Thickness Measurements for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks (Continued)

Special Surveys	Structural members subject to thickness measurement
4 Special Survey for ships over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) Suspect areas ~~2.~~(2) Within the cargo area: ~~(1)~~(a) Each deck plate ~~(2)~~(b) Three transverse sections. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~(3)~~(c) Each bottom plate ~~3.~~(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern ~~4.~~(4) All wind and water strakes ~~5.~~(5) Internals in fore peak tank and after peak ballast tank ~~6.~~(6) All exposed main deck plating outside the cargo area ~~7.~~(7) Representative exposed superstructure deck plating (poop, bridge and forecastle deck) ~~8.~~(8) All keel plates, full length, and an appropriate number of bottom plates in way of cofferdams, machinery space, and aft end of tanks ~~9.~~(9) Plating of sea chests, and shell plating in way of overboard discharges (as deemed necessary by the Surveyor) ~~10.~~(10) Cargo oil, fuel oil, ballast, vent pipes including vent masts and headers, inert gas pipes and all other piping in pump room and on weather decks, when deemed necessary by the Surveyor as a consequence of general examinations specified in **5.2.2** ~~11.~~(11) For ships carrying dangerous chemicals in bulk, selected steel cargo pipes outside cargo tanks and ballast pipes passing through cargo tanks

Table B5.10-2 has been amended as follows.

Table B5.10-2 Requirements of Thickness Measurements for Ships Carrying Liquefied Gases in Bulk

Special Surveys	Structural members and so forth subject to thickness measurement
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) Suspect area ~~2.~~(2) One transverse section of deck plating for the full beam of the ship within 0.5 *L* amidships in way of a ballast tank, if any ~~3.~~(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern
2 Special Survey for ships over 5 years and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) Suspect area ~~2.~~(2) Within the cargo area: ~~(1)~~(a) Each deck plate ~~(2)~~(b) One transverse section within 0.5 *L* amidships in way of a ballast tank, if any. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~3.~~(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern ~~4.~~(4) Selected wind and water strakes outside the cargo area
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) Suspect area ~~2.~~(2) Within the cargo area ~~(1)~~(a) Each deck plating ~~(2)~~(b) Two transverse sections. At least one section is to include a ballast tank within 0.5 *L* amidships, if any. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~(3)~~(c) All wind and water strakes ~~3.~~(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern ~~4.~~(4) Selected wind and water strakes outside the cargo area ~~5.~~(5) Internals in fore peak tank and after peak ballast tank
4 Special Survey for ships over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) Suspect area ~~2.~~(2) Within the cargo area: ~~(1)~~(a) Each deck plate ~~(2)~~(b) Three transverse sections. At least one section is to include a ballast tank within 0.5 *L* amidships, if any. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~(3)~~(c) Each bottom plate ~~(4)~~(d) Duct keel plating and internals ~~3.~~(3) Structural members subject to close-up survey for general assessment and recording of corrosion pattern ~~4.~~(4) All wind and water strakes ~~5.~~(5) Internals in fore peak tank and after peak ballast tank ~~6.~~(6) All exposed main deck plating outside the cargo area ~~7.~~(7) Representative exposed superstructure deck plating (poop, bridge and forecastle deck) ~~8.~~(8) All keel plates, full length, and an appropriate number of bottom plates in way of cofferdams, machinery space, and aft end of tanks ~~9.~~(9) Plating of sea chests, and shell plating in way of overboard discharges (as deemed necessary by the Surveyor)

Table B5.11 has been amended as follows.

Table B5.11 Requirements of Additional Thickness Measurements for Oil Tankers and Ships Carrying Dangerous Chemicals in bulk with integral tanks (Bottom Structure)

Structural member	Extent of Measurement	Pattern of Measurement
1. Inner bottom, bottom and hopper structure plating	~~a)~~(1) Minimum of 3 bays across tank, including aft bay. Measurements around and under all bell mouths. ~~b)~~(2) Suspect plates and adjacent plates, if any	~~a)~~(1) 5 point pattern for each panel between longitudinals and floors/webs ~~b)~~(2) 5 point pattern over 1 *m* length for each panel between longitudinals
2. Inner bottom, bottom and hopper structure longitudinals	(1) Minimum of 3 longitudinals in each bay where plating was measured.	3 measurements in line across flange and 3 measurements on vertical web.
3. Bottom girders and brackets	(1) At fore and aft floors or transverse bulkhead bracket toes, and in centre of tanks.	Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across face flat, if any. 5 point pattern on girder-bulkhead brackets, if any.
4. Bottom transverse webs/floors	(1) 3 webs/floors in bays where bottom plating was measured, with measurements at both ends and middle.	5 point pattern over 2 m^2 area. Single measurements on face flat, if any.
5. Panel stiffening (if any)	(1) Where fitted.	Single measurement
6. Hopper structure web frame rings (except for single hull oil tankers)	(1) 3 web frame rings in bays where bottom plating was measured.	5 point pattern over 1 m^2 of plating. Single measurements on flange.
7. Hopper structure transverse watertight bulkheads or swash bulkheads (except for single hull oil tankers)	~~a)~~(1) lower 1/3 of bulkhead ~~b)~~(2) upper 2/3 of bulkhead ~~c)~~(3) stiffeners (minimum of three)	~~a)~~(1) 5 point pattern over 1 m^2 of plating ~~b)~~(2) 5 point pattern over 2 m^2 of plating ~~c)~~(3) For web, 5 point pattern over span (two measurements across web at each end and one at centre of span). For flange, single measurements at each end and centre of span.

Table B5.12 has been amended as follows.

Table B5.12 Requirements of Additional Thickness Measurements for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks (Deck Structure)

Structural member	Extent of Measurement	Pattern of Measurement
1. Deck plating	(1) Two transverse bands across tank	Minimum of three measurements per plate per band
2. Deck longitudinals	(1) Minimum of 3 longitudinals in each of two bays (only for single hull oil tankers) (1) Every third longitudinal in each of two bands with a minimum of one longitudinal (except for single hull oil tankers)	3 measurements in line vertically on webs, and 2 measurements on flange (if fitted)
3. Deck girders and brackets	(1) At fore and aft transverse bulkheads, bracket toes and in centre of tanks	Vertical line of single measurements on web plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across flange. 5 point pattern on girder-bulkhead brackets
4. Deck transverse webs	(1) Minimum of two webs with measurements at both ends and middle of span	5 point pattern over about 1 m^2 (for single hull oil tankers, 2 m^2) areas. Single measurement on flange.
5. Vertical webs and transverse bulkheads in wing ballast tank within 2 *m* from deck (only for double hull)	(1) Minimum of two webs, and both transverse bulkheads	5 point pattern over 1 m^2 areas.
6. Panel stiffening	(1) Where applicable	Single measurement

Table B5.13 has been amended as follows.

Table B5.13 Requirements of Additional Thickness Measurements for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks (Side Shell and Longitudinal Bulkheads)

Structural member	Extent of Measurement	Pattern of Measurement
1 Side shell and longitudinal bulkhead plating:		
1 Deckhead and bottom strakes, and strakes in way of horizontal stringers	(1) Plating between each pair of longitudinals in a minimum of 3 bays	Single measurement
2 All other strakes	(1) Plating between every 3rd pair of longitudinals in same 3 bays	Single measurement
2 Side shell and longitudinal bulkhead longitudinal on:		
1 Deckhead and bottom strakes	(1) Each longitudinal in same 3 bays	3 measurements across web and 1 measurement on flange
2 All others strakes	(1) Every third longitudinal in same 3 bays	3 measurements across web and 1 measurement on flange
3 Brackets fitted to longitudinals	(1) Minimum of 3 at top, middle and bottom of tank in same 3 bays	5 point pattern over area of bracket
4 Vertical webs and transverse bulkheads excluding deckhead area (only for wing ballast tanks of double hull oil tankers and ships carrying dangerous chemicals in bulk):		
1 Strakes in way of horizontal girders	(1) Minimum of 2 webs and both transverse bulkheads	5 point pattern over approximately 2 m^2 area
2 All other strakes	(1) Minimum of 2 webs and both transverse bulkheads	2 measurements between each pair of vertical stiffeners
5 Horizontal girders (only for ships carrying dangerous chemicals in bulk and wing ballast tanks of double hull oil tankers)	(1) Plating on each girder in a minimum of 3 bays	2 measurements between each pair of horizontal girder stiffeners
6 Horizontal girder stiffeners (only for ships carrying dangerous chemicals in bulk and wing ballast tanks of double hull oil tankers)	(1) Where applicable	Single measurement
7 Web frames, transverses and cross ties (except for wing ballast tanks of double hull oil tankers and ships carrying dangerous chemicals in bulk)	(1) 3 webs with minimum of three locations on each web, including in way of cross tie connections	5 point pattern over about 2 m^2 area, plus single measurement on flanges of web frame, transverses and cross ties
8 Lower end brackets opposite transverses (only for cargo tanks of double hull oil tankers)	(1) Minimum of three brackets	5 point pattern over approximately 2 m^2 area, plus single measurement on bracket flanges

Table B5.14 has been amended as follows.

Table B5.14 Requirements of Additional Thickness Measurements for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks (Transverse Bulkheads and Swash Bulkheads except for Wing Ballast Tanks of Double Hull Oil Tankers)

Structural member	Extent of Measurement	Pattern of Measurement
1. Upper and lower stool, where fitted	(1) Transverse band within 25 *mm* of welded connection to inner bottom or deck plating (2) Transverse band within 25 *mm* of welded connection to shelf plate	5 point pattern over 1 *m* length
2. Deckhead and bottom strakes, and strakes in way of horizontal stringers	(1) Plating between pairs of stiffeners at 3 locations at approximately 1/4, 1/2 and 3/4 width of tank	5 point pattern over 1 *m* length between stiffeners
3. All other strakes	(1) Plating between pair of stiffeners at middle location	Single measurement
4. Strakes in corrugated bulkheads	(1) Plating for each change of scantling at centre of panel and at flange of fabricated connection	5 point pattern over about 1 m^2 of plating
5. Stiffeners	(1) Minimum of three typical stiffeners	For web, 5 point pattern over span between bracket connections (2 measurements across web at each bracket connection, and one at centre of span). For flange, single measurement at each bracket toe and at centre of span.
6. Brackets	(1) Minimum of three at top, middle and bottom of tank	5 point pattern over area of bracket
7. Deep webs and girders	(1) Measurements at toe of bracket and at centre of span	For web, 5 point pattern over about 1 m^2. 3 measurements across face flat.
8. Horizontal Stringers	(1) All horizontal stringers with measurements at both ends and middle	5 point pattern over 1 m^2 area, plus single measurements near bracket toes and on face flats

Table B5.15 has been amended as follows.

Table B5.15 Requirements of Thickness Measurements for Bulk Carriers

Special Surveys	Structural members subject to thickness measurement
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) Suspect areas ~~2.~~(2) At least structural members subject to close-up survey for general assessment and recording of corrosion pattern ~~3.~~(3) Air pipes and sounding pipes in cargo holds in way of tank top ~~4.~~(4) All cargo hold hatch coamings (plating and stiffeners) ~~5.~~(5) All cargo hold hatch covers (plating and stiffeners)
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) Suspect areas ~~2.~~(2) Structural members within the cargo length area: ~~(1)~~(a) Two transverse sections of deck plating, outside the line of cargo hatch openings ~~(2)~~(b) All strength deck plating, where log cargoes or other cargoes that are prone to accelerate corrosion are loaded ~~3.~~(3) At least structural members subject to close-up survey for general assessment and recording of corrosion pattern ~~4.~~(4) All piping arrangements in cargo holds. Depending upon the results of close-up surveys, may be omitted at the discretion of the Surveyor. ~~5.~~(5) All cargo hold hatch coamings (plating and stiffeners) ~~6.~~(6) All cargo hold hatch covers (plating and stiffeners) ~~7.~~(7) Wind and water strakes in way of the transverse sections of ~~2.(1)~~(2)(a) above ~~8.~~(8) Selected wind and water strakes outside the cargo length area
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) Suspect areas ~~2.~~(2) Structural members within the cargo length area: ~~(1)~~(a) Each deck plating outside the line of cargo hatch openings ~~(2)~~(b) Two transverse sections, one in the midship area, outside the line of cargo hatch openings. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~3.~~(3) At least structural members subject to close-up survey for general assessment and recording of corrosion pattern ~~4.~~(4) All piping arrangements in cargo holds. Depending upon the results of close-up surveys, may be omitted at the discretion of the Surveyor. ~~5.~~(5) All cargo hold hatch coamings (plating and stiffeners) ~~6.~~(6) All cargo hold hatch covers (plating and stiffeners) ~~7.~~(7) Internals in fore and aft peak ballast tanks ~~8.~~(8) All wind and water strakes within the cargo length area ~~9.~~(9) Selected wind and water strakes outside the cargo length area

Table B5.15 Requirements of Thickness Measurements for Bulk Carriers (Continued)

Special Surveys	Structural members subject to thickness measurement
4 Special Survey for ships over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) Suspect areas ~~2.~~(2) Structural members within the cargo length area: ~~(1)~~(a) Each deck plating outside the line of cargo hatch openings ~~(2)~~(b) Three transverse sections, one in the midship area, outside the line of cargo hatch openings. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~(3)~~(c) Each bottom plate ~~3.~~(3) At least structural members subject to close-up survey for general assessment and recording of corrosion pattern ~~4.~~(4) All piping arrangements in cargo holds. Depending upon the results of close-up surveys, may be omitted at the discretion of the Surveyor. ~~5.~~(5) All cargo hold hatch coamings (plating and stiffeners) ~~6.~~(6) All cargo hold hatch covers (plating and stiffeners) ~~7.~~(7) Internals in fore and aft peak ballast tanks ~~8.~~(8) All exposed main deck plating outside the cargo length area ~~9.~~(9) Representative exposed superstructure deck plating (poop, bridge and forecastle deck) ~~10.~~(10) All keel plates, full length, and an appropriate number of bottom plates in way of cofferdams, machinery space, and aft end of tanks ~~11.~~(11) Plating of sea chests, and shell plating in way of overboard discharges (as deemed necessary by the Surveyor) ~~12.~~(12) All wind and water strakes

Table B5.16 has been amended as follows.

Table B5.16 Requirements of Additional Thickness Measurements for Bulk Carriers (Shell Structures for Cargo Holds of Single Side Skin, or Structures in Double Side Skin Spaces including Wing Void Spaces in Ore Carriers)

Structural member	Extent of Measurement	Pattern of Measurement
For cargo holds of single side skin		
1. Bottom and Side Shell Plating	~~a)~~(1) Suspect plates and four adjacent plates ~~b)~~(2) For tanks and cargo holds, see other tables for particulars on gauging	~~a)~~ 5 point pattern for each panel between longitudinals
2. Bottom/Side Shell Longitudinals	(1) Minimum of three longitudinals in way of suspect areas	3 measurements in line across web 3 measurements on flange
For cargo holds of double side skin		
1. Side shell and inner plating:		
~~-~~ 1 Upper strake and strakes in way of horizontal girders	~~-~~ (1) Plating between each pair of transverse frames or longitudinals in a minimum of three bays (along the tank)	~~-~~ Single measurement
~~-~~ 2 All other strakes	~~-~~ (1) Plating between every third pair of longitudinals in same three bays	~~-~~ Single measurement
2. Side shell and inner side transverse frames / longitudinals on:		
~~-~~ 1 Upper strake	~~-~~ (1) Each transverse frame / longitudinal in same three bays	~~-~~ Three measurements across web and 1 measurement on flange
~~-~~ 2 All other strakes	~~-~~ (1) Every third transverse frame / longitudinal in same three bays	~~-~~ Three measurements across web and 1 measurement on flange
3. Transverse frames / longitudinals - brackets	(1) Minimum of three areas at top, middle and bottom of tank in same three bays	Five-point pattern over area of bracket
4. Vertical web and transverse bulkheads:		
~~-~~ 1 Strakes in a way of horizontal girders	~~-~~ (1) Minimum of two webs and both transverse bulkheads	~~-~~ Five-point pattern over approx. two square *metre* area
~~-~~ 2 Other strakes	~~-~~ (1) Minimum of two webs and both transverse bulkheads	~~-~~ Two measurements between each pair of vertical stiffeners
5. Horizontal girders	(1) Plating on each girder in a minimum of three bays	Two measurements between each pair of longitudinal girder stiffeners
6. Panel stiffening	(1) Where applicable	Single measurements

Table B5.17 has been amended as follows.

Table B5.17 Requirements of Additional Thickness Measurements for Bulk Carriers (Transverse Bulkheads in Cargo Holds)

Structural member	Extent of Measurement	Pattern of Measurement
1. Lower Stool	~~a)~~(1) Transverse band within 25 *mm* of welded connection to inner bottom ~~b)~~(2) Transverse band within 25 *mm* of welded connection to shelf plate	(a) 5 point over 1 *metre* length between stiffeners
2. Transverse Bulkhead	~~a)~~(1) Transverse band at approximately middle height ~~b)~~(2) Transverse band at part of bulkhead adjacent to upper deck or below upper stool shelf plate (for those ships fitted with an upper stool)	(a) 5 point pattern over 1 *sq. metre* of plating

Table B5.18 has been amended as follows.

Table B5.18 Requirements of Additional Thickness Measurements for Bulk Carriers (Deck Structure Including Cross Deck, Main Deck, Cargo Hatchways, Hatch Covers, Coamings and Topside Tanks)

Structural member	Extent of Measurement	Pattern of Measurement
1 Cross Deck Strip Plating	(1) Suspect cross deck strip plating	5 point pattern over 1 *metre* length between underdeck stiffeners
2 Underdeck Stiffeners	~~a)~~(1) Transverse members ~~b)~~(2) Longitudinal member	~~a)~~(1) 5 point pattern at each end and mid span ~~b)~~(2) 5 point pattern on both web and flange
3 Hatch Covers	~~a)~~(1) Side and end skirt, each 3 locations ~~b)~~(2) 3 longitudinal bands, outboard strakes (2) and centreline strake (1)	~~a)~~(1) 5 point pattern at each location ~~b)~~(2) 5 point measurement each band
4 Hatch Coamings	(1) Lower 1/3 and upper 2/3 of each side and end coaming	5 point measurement at each band i.e. end or side coaming
5 Topside Water Ballast Tanks	~~a)~~(1) Watertight transverse bulkheads ~~i.~~(a) lower 1/3 of bulkhead ~~ii.~~(b) upper 2/3 of bulkhead ~~iii.~~(c) stiffeners	~~a)~~ ~~i.~~(a) 5 point pattern over 1 *sq. metre* of plating ~~ii.~~(b) 5 point pattern over 1 *sq. metre* of plating ~~iii.~~(c) 5 point pattern over 1 *metre* length
	~~b)~~(2) 2 representative swash transverse bulkheads ~~i.~~(a) lower 1/3 of bulkhead ~~ii.~~(b) upper 2/3 of bulkhead ~~iii.~~(c) stiffeners	~~b)~~ ~~i.~~(a) 5 point pattern over 1 *sq. metre* of plating ~~ii.~~(b) 5 point pattern over 1 *sq. metre* of plating ~~iii.~~(c) 5 point pattern over 1 *metre* length
	~~c)~~(3) 3 representative bays of sloping plating ~~i.~~(a) lower 1/3 of tank ~~ii.~~(b) upper 2/3 of tank	~~c)~~ ~~i.~~(a) 5 point pattern over 1 *sq. metre* of plating ~~ii.~~(b) 5 point pattern over 1 *sq. metre* of plating
	~~d)~~(4) Longitudinals, suspect and adjacent	~~d)~~ 5 point pattern both web and flange over 1 meter length
6 Main Deck Plating	(1) Suspect plates and adjacent (4)	5 point pattern over 1 *sq. metre* of plating
7 Main Deck Longitudinals	(1) Minimum of 3 longitudinals where plating measured	5 point pattern on both web and flange over 1 *metre* length
8 Web Frames/Transverses	(1) Suspect plates	5 point pattern over 1 *sq. metre*

Table B5.19 has been amended as follows.

Table B5.19 Requirements of Additional Thickness Measurements for Bulk Carriers (Bottom, Inner Bottom and Hopper Structure)

Structural member	Extent of Measurement	Pattern of Measurement
For cargo holds of single side skin		
1. Inner / Double Bottom Plating	(1) Suspect plates plus all adjacent plates	5 point pattern over 1 *metre* length for each panel between longitudinals
2. Inner / Double Bottom Longitudinals	(1) 3 longitudinals where plates measured	3 measurements in line across web and 3 measurements on flange
3. Longitudinal Girders or Transverse Floors	(1) Suspect plates	5 point pattern over about 1 *sq. metre*
4. Watertight Bulkheads (WT Floors)	~~a)~~ (1) lower 1/3 of tank ~~b)~~ (2) upper 2/3 of tank	~~a)~~ (1) 5 point pattern over 1 *sq. metre* of plating ~~b)~~ (2) 5 point pattern on alternate plates over 1 *sq. metre* of plating
5. Web Frames	(1) Suspect plates	5 point pattern over 1 *sq. metre* of plating
6. Bottom / Side shell longitudinals	(1) Minimum of 3 longitudinals in way of suspect areas	~~a)~~ 3 measurements in line across web ~~b)~~ 3 measurements on flange
For cargo holds of double side skin		
1. Bottom, inner bottom and hopper structure plating	(1) Minimum of three bays across double bottom tank, including aft bay Measurements around and under all suction bell mouths	Five-point pattern for each panel between longitudinals and floors
2. Bottom, inner bottom and hopper structure longitudinals	(1) Minimum of three longitudinals in each bay where bottom plating measured	Three measurements in line across flange and three measurements on the vertical web
3. Bottom girders, including the watertight ones	(1) At fore and aft watertight floors and in centre of tanks	Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements
4. Bottom floors, including the watertight ones	(1) Three floors in the bays where bottom plating measured, with measurements at both ends and middle	Five-point pattern over 2 *sq. metre* area
5. Hopper structure web frame ring	(1) Three floors in bays where bottom plating measured	Five-point pattern over 1 *sq. metre* of plating Single measurements on flange
6. Hopper structure transverse watertight bulkhead or swash bulkhead	(1) Lower 1/3 of bulkhead	five-point pattern over 1 *sq. metre* of plating
	(2) upper 2/3 of bulkhead	five-point pattern over 2 *sq. metres* of plating
	(3) stiffeners (minimum of three)	For web, five-point pattern over span (two measurements across web at each end and one at centre of span). For flange, single measurements at each end and centre of span
7. Panel stiffening	(1) Where applicable	Single measurements

Table B5.20 has been amended as follows.

Table B5.20 Requirements of Additional Thickness Measurements for Bulk Carriers (Cargo Holds of Single Side Skin)

Structural member	Extent of Measurement	Pattern of Measurement
1~~.~~ Side Shell Frames	(1) Suspect frames and adjacent frames	~~a)~~ At each end and mid span: 5 point pattern of both web and flange ~~b)~~ 5 point pattern within 25 *mm* of welded attachment to both shell and lower slope plate

Table B5.21 has been amended as follows.

Table B5.21 Requirements of Thickness Measurements for General Dry Cargo Ships of Not less than 500 *gross tonnage*

Special Surveys	Structural members subject to thickness measurement
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) Suspect areas ~~2.~~(2) At least the following structural members for general assessment and recording of corrosion pattern: ~~(1)~~(a) In cargo holds where cargoes highly corrosive to steel such as logs, salt, coal, and sulfide ore have been loaded: lower parts of web (thinnest parts of web in case of built-up type frame) and their lower end brackets of at least three hold frames at forward, middle and aft parts on both sides of each cargo hold ~~(2)~~(b) At least one plate of lowest strake and strakes in way of tween decks of all watertight transverse bulkheads in cargo spaces specified in ~~(1)~~(a) above together with internals in way ~~(3)~~(c) For top side tanks, bilge hopper tanks and deep tanks used as ballast tanks: both ends and middle part (including face plate) of one transverse ring or corresponding main structural members in one tank selected arbitrarily from each type
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) Suspect areas ~~2.~~(2) Following portions of structural members within 0.5 *L* amidships; ~~(1)~~(a) Each plate in one section of the strength deck plating for the full beam of the ship ~~(2)~~(b) Each strength deck plate in way of water ballast tanks, if any ~~(3)~~(c) Each strength deck plate on or underneath which log cargoes or other cargoes that are prone to accelerate corrosion have been carried ~~3.~~(3) At least the following structural members for general assessment and recording of corrosion pattern: ~~(1)~~(a) In cargo holds specified in ~~2.(1)~~(2)(a) of Special Survey No.1 above: lower and upper parts of web (thinnest parts of web in case of built-up type frame) and their end brackets of a sufficient number (at least 1/3 of total number) of frames at forward, middle, and aft parts on both sides of each cargo hold ~~(2)~~(b) All plates of lowest strake and strakes in way of tween decks of all watertight transverse bulkheads in cargo spaces specified in **~~(1)~~(a)** above together with internals in way ~~(3)~~(c) In cargo holds other than **~~(1)~~(a)** above, structural members specified in ~~2.(1)~~(2)(a) and ~~(2)~~(b) of Special Survey No.1 above. ~~(4)~~(d) For top side tanks, bilge hopper tanks and deep tanks used as ballast tanks: both ends and middle part (including face plate) of approximately half the number of transverse rings or corresponding main structural members and at least one plate of upper and lower ends of each bulkhead in one tank selected arbitrarily from each type ~~(5)~~(e) For remaining top side tanks, bilge hopper tanks and deep tanks used as ballast tanks: both ends and middle part of one transverse ring or corresponding main structural members (including face plate) ~~(6)~~(f) Other structural members subject to close-up survey ~~(7)~~(g) Air pipes and sounding pipes in cargo holds in way of tank top ~~4.~~(4) All cargo hold hatch coamings (plating and stiffeners) ~~5.~~(5) All cargo hold hatch covers (plating and stiffeners)

Table B5.21 Requirements of Thickness Measurements for General Dry Cargo Ships of Not less than 500 *gross tonnage* (Continued)

Special Surveys	Structural members subject to thickness measurement
3 Special Survey for ships over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) Suspect areas ~~2.~~(2) Structural members within the cargo length area: ~~(1)~~(a) Each deck plating outside the line of cargo hatch openings ~~(2)~~(b) Each deck plating inside the line of cargo hatch openings within 0.5 *L* amidships ~~(3)~~(c) Each plate and member in two transverse sections, one in the midship area, within 0.5 *L* amidships. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~(4)~~(d) All wind and water strakes ~~3.~~(3) Selected wind and water strakes outside the cargo length area ~~4.~~(4) At least the following structural members for general assessment and recording of corrosion pattern: ~~(1)~~(a) Lower and upper parts of web (thinnest parts of web in case of built-up type frame) and their end brackets of a sufficient number (at least 1/3 of total number) of frames at forward, middle, and aft parts on both sides of each cargo hold ~~(2)~~(b) Other structural members subject to close-up survey ~~(3)~~(c) Air pipes and sounding pipes in cargo holds in way of tank top ~~5.~~(5) Internals in fore and aft peak ballast tank ~~6.~~(6) All cargo hold hatch coamings (plating and stiffeners) ~~7.~~(7) All cargo hold hatch covers (plating & stiffeners)
4 Special Survey for ships over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) Suspect areas ~~2.~~(2) Following portions of structural members ~~(1)~~(a) All exposed main deck plates, full length ~~(2)~~(b) Each plate and member in three transverse sections, one in the midship area, within 0.5 *L* amidships. When the selected section is a transversely framed section, adjacent frames and their end connections in way of the transverse section are to be included. ~~(3)~~(c) Each bottom plate within cargo length area, including lower turn of bilge ~~(4)~~(d) Duct keel or pipe tunnel plating and internals within cargo length area ~~3.~~(3) All wind and water strakes ~~4.~~(4) At least the following structural members for general assessment and recording of corrosion pattern: ~~(1)~~(a) Structural members subject to close-up survey ~~(2)~~(b) Air pipes and sounding pipes in cargo holds in way of tank top ~~5.~~(5) Representative exposed superstructure deck plating (poop, bilge and forecastle deck) ~~6.~~(6) All keel plate full length, and an appropriate number of bottom plates in way of cofferdams, machinery spaces and aft end of tanks ~~7.~~(7) Plating of sea chests, and shell plating in way of overboard discharges (as deemed necessary by the Surveyor) ~~8.~~(8) Structural members specified in ~~5.~~(5)to ~~7.~~(7) of Special Survey No.3 above

Table B5.22 has been amended as follows.

Table B5.22 Requirements of Pressure Tests for Cargo Ships

Special Survey	Tanks subject to pressure tests
1 All Special Survey	~~1.~~(1) All water tanks including cargo holds used for ballast and all cargo tanks Pressure tests of fresh water tanks may be specially considered when deemed appropriate by the Society. ~~2.~~(2) All fuel oil tanks Pressure tests may be specially considered when deemed appropriate by the Society. ~~3.~~(3) All lubrication oil tanks Pressure tests may be specially considered when deemed appropriate by the Society.

Table B5.23-1 has been amended as follows.

Table B5.23-1 Requirements of Pressure Tests for Oil Tankers and Ships Carrying Dangerous Chemicals in Bulk with integral tanks

Special Survey	Tanks subject to pressure tests
1 Special Survey for ships up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, fuel oil tanks, pump rooms and cofferdams ~~2.~~(2) All water tanks Pressure tests of fresh water tanks may be specially considered when deemed appropriate by the Society. ~~3.~~(3) All fuel oil tanks Pressure tests may be specially considered when deemed appropriate by the Society. ~~4.~~(4) All lubrication oil tanks Pressure tests may be specially considered when deemed appropriate by the Society.
2 Special Survey for ships over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) All cargo tank bulkheads ~~2.~~(2) For water tanks, fuel oil tanks and lubrication oil tanks, as Special Survey No.1
3 Special Survey for ships over 10 *years* of age (Special Survey No.3 and subsequent Special Surveys)	~~1.~~(1) All cargo tank bulkheads ~~2.~~(2) For water tanks, fuel oil tanks and lubrication oil tanks, as Special Survey No.1 ~~3.~~(3) For ships carrying dangerous chemicals in bulk, selected steel cargo pipes outside cargo tanks and ballast pipes passing through cargo tanks

Table B5.23-2 has been amended as follows.

Table B5.23-2 Requirements of Pressure Tests for Ships Carrying Liquefied Gases in Bulk

Special Survey	Tanks subject to pressure tests
1 All Special Surveys	~~1.~~(1) All boundaries of ballast tanks and deep tanks within the cargo area ~~2.~~(2) Representative fuel oil tanks within the cargo area. When deemed appropriate by the Society, pressure tests may be specially considered. ~~3.~~(3) All water tanks Pressure tests of fresh water tanks may be specially considered when deemed appropriate by the Society. ~~4.~~(4) All fuel oil tanks outside the cargo area Pressure tests may be specially considered when deemed appropriate by the Society. ~~5.~~(5) All lubrication oil tanks Pressure tests may be specially considered when deemed appropriate by the Society.

Table B5.24 has been amended as follows.

Table B5.24 Requirements of Pressure Tests of Bulk Carriers and Dry Cargo Ships of Not less than 500 *gross tonnage*

Special Survey	Tanks subject to pressure tests
1 All Special Surveys	~~1.~~(1) All boundaries of ballast tanks, deep tanks and cargo holds used for ballast within the cargo length area ~~2.~~(2) Representative fuel oil tanks within the cargo length area. When deemed appropriate by the Society, pressure tests may be specially considered. ~~3.~~(3) All water tanks Pressure tests of fresh water tanks may be specially considered when deemed appropriate by the Society. ~~4.~~(4) All fuel oil tanks outside the cargo length area Pressure tests may be specially considered when deemed appropriate by the Society. ~~5.~~(5) All lubrication oil tanks Pressure tests may be specially considered when deemed appropriate by the Society.

Table B5.25 has been amended as follows.

Table B5.25 Additional Requirements at Special Surveys for Machinery

Items	Examinations
1 Reciprocating internal combustion engines (main propulsion machinery and auxiliary machinery for propulsion, manoeuvring and personnel safety)	~~(a)~~(1) The essential part of the crankcase and cylinder jacket, the foundation bolts, the chock liners and the tie rod bolts are to be generally examined. ~~(b)~~(2) The doors of the crankcase and the explosion relief devices of the crankcase and scavenge space are to be generally examined. ~~(c)~~(3) The anti-vibration dampers, detuners, balancers, and compensators are to be generally examined. ~~(d)~~(4) The crankshaft alignment is to be checked and if necessary, adjusted.
2 Electrical installations	~~(a)~~(1) The switchboards (including those for emergency), distribution boards, cables, etc. are, as far as practicable, to be generally examined. ~~(b)~~(2) Insulation resistance of the generators and switchboards (the both including those for emergency use), the motors and the cables; the main circuits of control gears for electric propulsion motors and semiconductor converters for propulsion of electric propulsion ships are to be tested to ensure that they are placed in good order, and to be adjusted if it is found not to comply with the requirements **2.18.1**, **Part H**. However, where a proper record of measurement is maintained and deemed appropriate by the Surveyor, consideration may be given to accepting recent readings.
3 Refrigerating machinery	~~(a)~~(1) Safety devices are to be generally examined to ascertain that they are placed in good order. ~~(b)~~(2) The machinery is to be examined while in operation to ascertain that there is no leakage of refrigerant.
4 Spare parts and associated fittings	(1) Spare parts and their associated fittings for machinery are to be examined.
Requirements for Tankers	
1 Electrical installations in hazardous areas	~~(a)~~(1) Electrical installations in hazardous areas are to be examined in detail and confirmation that they conform to the requirements in **4.2.7**, **Part H** is to be carried out. In addition, confirmation that the installations are in good order is to be made by measuring the insulation resistance. However, this measurement may be omitted at the discretion of the Surveyor, if accurate measurement records of the insulation resistance can be verified. ~~(b)~~(2) Performance tests of interlock devices associated with pressurized protected type electrical equipment and electrical equipment installed in pressurized or ventilated areas are to be carried out.

Table B5.26 has been amended as follows.

Table B5.26 Additional Requirements at Special Surveys

Items		Examinations	
1	Speed governors, generator circuit breakers and associated relays	(1)	Performance tests are to be carried out with all generators operating under loaded condition, either separately or in parallel, as far as practicable.
2	Condensers, evaporators, and receivers	(1)	For those that use NH_3 (R717) as the refrigerant, the parts exposed to the primary refrigerant are to be tested at a pressure of 90% of the design pressure (the pressure may be reduced down to 90% of the setting pressure of the relief valves). However, the pressure test may be replaced by other means as deemed appropriate by the Society.
3	All other piped machinery and parts not specified in -2 above	(1)	Pressure tests are to be handled in accordance with the requirements of **2.2.2(2)** where deemed necessary by the Surveyor.
4	Lighting systems, communication and signalling systems, ventilating systems, and other electrical equipment	(1)	Performance tests (including operation tests) of interlocking devices used to ensure safe operation are to be carried out where deemed necessary by the Surveyor.
5	Electric generator sets, etc.	(1)	Performance tests of electric generator sets and important auxiliaries are to be carried out.

Table B5.27 has been amended as follows.

Table B5.27 Special Requirements for Ships Carrying Liquefied Gases in Bulk

Items	Examinations
1 Cargo tanks	(1) The following examinations are to be carried out [*1]: (a) An internal examination of all cargo tanks (b) A visual examination of insulation[*2] or cargo tank surface (if insulation is not fitted) Special attention is to be paid to chocks, supports, keys and other parts of the tank foundations. Removal of insulation may be required where deemed necessary by the Surveyor. (c) Thickness measurements for cargo tank plate (where deemed necessary by the Surveyor) (d) Non-destructive test for independent tank of Type *B* in accordance with the approved program This program is to be prepared according to the cargo tank design. Cargo tanks other than independent tanks of Type *B* are to be examined by non-destructive tests on welded connections of the tank shell, main structural members and other parts liable to bear high stress[*3]. However, non-destructive testing for independent tanks of Type *C* cannot be dispensed with totally. (e) Leak tests of all cargo tanks However, the leak test of independent tanks below deck may be omitted, if it is verified by the log book or other proper means that gas detecting devices are in normal condition and no leak is recorded. (2) Where there is any doubt on the integrity of any of the cargo tanks as a result of the examinations (1)(a) through (e) ~~above~~, the tank is to be tested under the pressures specified below. (a) For independent tanks of Type *C*: Not less than 1.25 times maximum allowable design pressure (hereinafter referred to as *MARVS*) of pressure relief valves (b) For independent tanks of Type *A* and *B* and integral tanks: Appropriate pressure according to the cargo tank design (3) For independent tanks of Type *C*, either of the following tests ~~(i)~~(a) or ~~(ii)~~(b) is to be carried out at every second Special Survey in addition to examinations (1)(a) through (e). ~~(i)~~(a) Tests at a pressure 1.25 times *MARVS*, and thereafter, the non-destructive test stipulated in (1)(d) ~~(ii)~~(b) Non-destructive test according to the program prepared for the cargo tank design[*4]
2 Hold spaces and secondary barriers	~~-~~(1) Tank supporting and surrounding hull structures in hold spaces, secondary barriers and their insulation are to be visually examined. ~~-~~(2) For membrane containment systems, it is to be verified that secondary barriers keep a specific level of tightness required in the system design in accordance with programs and acceptance criteria approved in advance. However, low differential pressure tests are not to be considered an acceptable test for the tightness of secondary barriers. For membrane containment systems with glued secondary barriers, if the verification results do not satisfy the approved acceptance criteria, an investigation is to be carried out and additional testing such as thermographic or acoustic emissions testing is to be carried out. ~~-~~(3) For other cargo containment systems, in cases where there is any doubt about integrity of secondary barriers, the integrity is to be verified by pressure or vacuum test or other proper means.[*5]
3 Venting system for cargo tanks	(1) Pressure relief valves for cargo tanks are to be overhauled, readjusted, performance-tested and sealed.[*6] Pressure/vacuum relief devices and associated safety systems for interbarrier spaces and hold spaces are to be examined, overhauled and tested depending on their design.[*6]
4 Cargo and process piping	(1) Examinations (a) and (b) are to be carried out. Removal of insulation may be required where deemed necessary by the Surveyor. (a) Where deemed necessary by the Surveyor; whole or a part of the valves and associated fittings are to be overhauled, or a pressure test at a pressure 1.25 times *MARVS* is to be carried out and after the pipes that were removed are reinstalled, a leak test is to be carried out (b) Pressure relief valves are to be visually examined and whole or a part of these valves are to be overhauled, readjusted, performance tested and sealed.

Table B5.27 Special Requirements for Ships Carrying Liquefied Gases in Bulk (Continued)

Items	Examinations
5 Cargo handling equipment	(1) Examinations and tests (a) through (c) are to be carried out. (a) Cargo pumps, cargo gas compressors and gas blowers, and their prime movers are to be overhauled and performance tests for safety devices are to be carried out. Overhaul of electric motors as prime movers may be dispensed with.[*7] (b) Heat exchangers, pressure vessels and evaporators are to be overhauled and pressure relief valves are to be performance tested. If an internal examination of vessels is impracticable, a pressure test of vessels and a performance test of pressure relief valves are to be carried out.[*7] (c) The following tests ~~(~~i) through ~~(~~iii) are to be carried out for refrigerating equipment. ~~(~~i) Overhaul of pumps and compressors and performance tests of pressure vessels such as condensers, evaporators, inter-coolers, oil separators and relief valves[*7] ~~(~~ii) Leak test of pressure vessels and heat exchangers at a pressure of not less than 90% of the set pressure of relief valves ~~(~~iii) Leak test of refrigerant piping system at a pressure of not less than 90% of set pressure of relief valves (d) Gas combustion units (*GCU*s) are to be overhauled.
6 Emergency shutdown devices	(1) For emergency shutdown valves, open-up examinations and leakage testing of valve seats are to be carried out. [*6] [*8]
7 Electrical installations in hazardous areas	(1) Examinations for tankers of **Table B5.25** are to be carried out.

Notes:

(*1) For membrane and semi-membrane tanks and internal insulation tanks, examination and testing are to be carried out in accordance with programs specially prepared according to approved methods for each tank system.

(*2) If visual examination of the insulation of tanks is impossible, the surrounding structural members are to be examined for cold spots when the cargo tanks are cooled. However, where integrity of cargo tanks and their insulation is verified by the cargo log book, the examination of cold spots may be omitted.

(*3) Parts liable to bear high stress:

- cargo tank supports and anti-rolling / anti-pitching devices
- web frames or stiffening rings
- swash bulkhead boundaries
- dome and sump connections to tank shell
- foundations for pumps, towers, ladders, etc.
- pipe connections

(*4) If an approved non-destructive test program does not exist, then a non-destructive test of at least 10 % of the length of the welded connections in each of the highly stressed areas below is to be conducted. This test is to be carried out from both inside and outside of the tank as appropriate and insulation is to be removed, as necessary.

- cargo tank supports and anti-rolling / anti-pitching devices
- stiffening rings
- Y-connections between tank shell and a longitudinal bulkhead of bilobe tanks
- swash bulkhead boundaries
- dome and sump connections to tank shell
- foundations for pumps, towers, ladders, etc.
- pipe connections

(*5) Appropriate pressure or vacuum tests and examination for cold spots are to be carried out. However, where integrity of insulation is verified by the log book, examination for cold spots may be omitted.

(*6) For valves of which continuous open-up examinations and operation tests have been carried out in the presence of a Surveyor after the previous Special Survey and whose test records are confirmed, open-up examinations may be replaced by visual examinations to the extent that such visual examinations are feasible.

(*7) Equipment that has the open inspection at Planned Machinery Surveys need only be visually examined at Special Surveys.

(*8) In cases where the conditions of valve bodies and valve seats can be checked without removing their valve casings from the fitted piping, internal confirmatory examinations may be regarded as open-up examinations. In cases where the condition of the valve is confirmed to be good during such examinations, leakage testing may be omitted.

Table B5.28 has been amended as follows.

Table B5.28 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk

Items	Examinations	
1 Insulation of cargo tanks	(1)	A general examination of the insulation is to be carried out. Where deemed necessary by the Surveyor, removal of the insulation may be required.
2 Cargo tank foundations	(1)	A general examination of the foundations of cargo tanks including supports, keys and anti-rolling / anti-pitching devices is to be carried out. Where deemed necessary by the Surveyor, removal of the insulation may be required.
3 Sealing arrangement for tanks	(1)	A general examination of the sealing arrangement for tanks and tank covers penetrating decks is to be carried out. Where deemed necessary by the Surveyor, removal of the insulation or covers, or performance tests of the closing devices may be required.
4 Cargo pumps	(1)	Main parts of cargo pumps are to be opened up and examined.[*1]
5 Electrical installations in hazardous areas	(1)	Examinations specified for tankers in item 2 of **Table B5.25** are to be carried out.

Note:

(*1) Equipment that has the open inspection at Planned Machinery Surveys need only be visually examined at Special Surveys.

Table B5.29 has been amended as follows.

Table B5.29 Special Requirements for Ships Using Low-flashpoint Fuels

Items	Examinations
1 Fuel storage tanks	(1) The following examinations and testing are to be carried out [*1]: (a) Internal examinations of all fuel storage tanks. Vacuum insulated independent fuel storage tanks of type *C* without access openings, however, need not be examined internally. Where fitted, the vacuum monitoring system is to be examined, and records are to be reviewed. (b) Visual examinations of thermal insulation[*2] or surfaces of fuel storage tanks without thermal insulation i) Special attention is to be paid in way of chocks of tank foundations, tank supports, keys, etc. Removal of thermal insulation may be required where deemed necessary by the Surveyor. ii) Non-destructive testing may be required if conditions raise doubt to the structural integrity. (c) Thickness measurements for tank plates may be required where deemed necessary by the Surveyor. (d) Non-destructive testing for independent fuel storage tanks of Type *B* in accordance with the approved programme is to be carried out. The programme is to be that prepared according to fuel storage tank design. Fuel storage tanks other than independent fuel storage tanks of Type *B* are to be examined by non-destructive testing on welded connections of the tank plates, main structural members and parts where high stress is deemed likely to occur where deemed necessary by the Surveyor.[*3] (e) Leakage testing of all fuel storage tanks (2) Where there is any doubt regarding the integrity of a fuel storage tank as a result of examinations specified in (1)(a) to (e)~~=above~~, such a fuel storage tank is to be tested by hydraulic or hydro-pneumatic testing under the pressures specified below: (a) Independent fuel storage tanks of Type *C*: a pressure not less than 1.25 times the maximum allowable relief valve setting (hereinafter referred to as "*MARVS*"); or (b) For integral tanks and for independent tanks of Type *A* and *B*: an appropriate pressure according to fuel storage tank design, as far as practicable, with the pressure at the top of the tank corresponding at least to the *MARVS*. (3) For all independent fuel storage tanks of Type *C*, either the following ~~i)~~(a) or ~~ii)~~(b) examination is to be carried out at every second Special Survey in addition to examinations (1)(a) to (e). ~~i)~~(a) Hydraulic or hydro-pneumatic testing at a pressure not less than 1.25 times *MARVS*, and the non-destructive testing specified in (1)(d) ~~ii)~~(b) Non-destructive testing according to a programme prepared based upon fuel storage tank design[*4] (4) Where water cannot be tolerated and the fuel storage tank cannot be dried prior to putting the tank into service, the Surveyor may accept alternative testing fluids or alternative means of testing.
2 Tank support arrangements, tank fixing arrangements, etc.	~~-~~(1) Tank support arrangements, anti-rolling or anti-pitching devices, and surrounding hull structures and their thermal insulation are to be visually examined. Non-destructive testing may be required if conditions raise doubt to the structural integrity. ~~-~~(2) For membrane tanks, it is to be verified that the gas-tightness of secondary barriers is kept on the level of tightness required for system design in accordance with the programme and acceptance criteria approved in advance. Low differential pressure testing, however, is not to be adopted for testing the tightness of secondary barriers. For glued secondary barriers, if the verification results do not satisfy the required level of gas-tightness, an investigation is to be carried out to analyse the causes of failure, and additional testing such as thermographic or acoustic emission testing is to be carried out taking into account the analysis. ~~-~~(3) For other secondary barriers, gas-tightness is to be verified by pressure or vacuum testing or other proper means in cases where there is any doubt.[*5]

Table B5.29 Special Requirements for Ships Using Low-flashpoint Fuels (Continued)

Items	Examinations
3 Venting systems for fuel contain- ment systems	(1) The pressure relief valves for the fuel storage tanks are to be opened for examination, adjusted, function tested and sealed.[*6] If the tanks are equipped with relief valves with non-metallic membranes in the main or pilot valves, such non-metallic membranes are to be replaced. (2) The pressure/vacuum relief valves, rupture disc and other pressure relief devices for interbarrier spaces and fuel storage hold spaces are to be opened, examined, tested and readjusted as necessary, depending on their design.[*7] (3) The vacuum protection systems for fuel storage tanks are to be overhauled and tested appropriately for the design.[*8]
4 Fuel piping and process piping systems, etc.	(1) The following examinations and testing are to be carried out. (a) All piping for fuel storage, fuel bunkering, and fuel supply such as venting, compressing, refrigerating, liquefying, heating, storing, burning or otherwise handling the fuel and liquid nitrogen installations are to be examined. Removal of thermal insulation from the piping and opening for examination may be required where deemed necessary by the Surveyor. (b) Where deemed suspect by the Surveyor during (a) above, a hydrostatic test to 1.25 times the *MARVS* for the pipeline is to be carried out. After reassembly, the complete piping is to be tested for leaks. Where water cannot be tolerated and the piping cannot be dried prior to putting the system into service, the Surveyor may accept alternative testing fluids or alternative means of testing. (c) Pressure relief valves for the fuel supply and bunkering piping is to be opened for examination, adjusted, and function tested and sealed. Where a proper record of continuous overhaul and retesting of individually identifiable relief valves is maintained, consideration will be given to acceptance on the basis of opening, internal examination, and testing of a representative sampling of valves, including each size and type of liquefied gas or vapor relief valve in use, provided there is logbook evidence that the remaining valves have been overhauled and tested since crediting of the previous Special Survey. (d) All emergency shut-down valves, check valves, block and bleed valves, master gas valves, remote operating valves, isolating valves for pressure relief valves in the fuel storage, fuel bunkering, and fuel supply piping systems are to be examined and proven operable. A random selection of valves is to be opened for examination. (e) Leakage testing of the emergency shut-down valves opened in accordance with **(d)** above is to be carried out.
5 Components of bunkering systems, fuel containment systems, gas consumers and fuel supply systems for low-flashpoint fuels	(1) The following examinations and testing are to be carried out. (a) Fuel pumps and fuel compressors as well as their prime movers are to be overhauled, and performance testing of safety devices is to be carried out. Overhauling of electric motors for prime movers, however, may be omitted.[*9] (b) Heat exchangers, pressure vessels, including process pressure vessels, evaporators and other components used in connection with fuel handling are to be overhauled. Pressure relief systems are to be performance tested. If an internal examination of the pressure vessels, including process pressure vessels, is impracticable, pressure testing of the vessels and performance testing of pressure relief systems are to be carried out.[*9] (c) The examinations specified in the following i) to iii) are to be carried out for refrigerating equipment. i) Overhauling of pumps and compressors and performance testing of pressure vessels such as condensers, evaporators, inter-coolers and oil separators and the relief systems[*9] ii) Leakage testing of pressure vessels and heat exchangers at a pressure not less than 90% of the setting pressure of their relief systems iii) Leakage testing of refrigerant piping systems at a pressure of not less than 90% of the setting pressure of their relief systems (d) General examinations of inert gas generators are to be carried out. (e) Gas combustion units (GCUs) are to be overhauled.

Table B5.29 Special Requirements for Ships Using Low-flashpoint Fuels (Continued)

Items	Examinations
6 Electrical installations	(1) The following examinations and testing are to be carried out. (a) Examination of electrical equipment to include the physical condition of electrical cables and supports, intrinsically safe, explosion proof, or increased safety features of electrical equipment. (b) Testing of systems for de-energizing electrical equipment which is not certified for use in hazardous areas. (c) An electrical insulation resistance test of the circuits terminating in, or passing through, the hazardous zones and spaces is to be carried out. However, this test may be omitted at the discretion of the Surveyor, if accurate test records of the insulation resistance can be verified. (d) The earthing between fuel storage tanks or fuel piping systems (fuel pipes, vent pipes, etc.) and hull structures is to be examined. (e) Electrical installations in hazardous areas are to be examined in detail and confirmation that they conform to the requirements in **4.2.7, Part H** is to be carried out. (f) Performance tests of interlock devices associated with pressurized protected type electrical equipment and electrical equipment installed in pressurized or ventilated areas are to be carried out. In addition, functional testing of pressurized equipment and associated alarms is to be carried out.
7 Safety Systems	(1) Gas detectors, temperature sensors, pressure sensors, level indicators, and other equipment providing input to the fuel safety system are to be tested to confirm satisfactory operating condition. (a) Proper response of the fuel safety system upon fault conditions is to be verified. (b) Pressure, temperature and level indicating equipment are to be calibrated in accordance with the manufacturer's requirements.

Notes:

(*1) For membrane tanks, examinations and testing are to be carried out in accordance with a programme specially prepared according to methods approved for each tank system.

(*2) If visual examinations of the thermal insulation of tanks are impossible, their surrounding structural members are to be examined for cold spots when the fuel storage tanks are cooled. Where the integrity of fuel storage tanks and their thermal insulation is verified by checking the bunker delivery note for the low-flashpoint fuel delivered, however, the examinations of cold spots may be omitted.

(*3) For type *C* tanks, non-destructive testing is not to be totally dispensed with. Parts where high stress is deemed likely to occur:

- fuel storage tank supports and anti-rolling/anti-pitching devices
- web frames or stiffening rings
- swash bulkhead boundaries
- dome and sump connections to tank shell
- foundations for fuel pumps, towers or ladders, etc.
- pipe connections

(*4) If an approved non-destructive testing programme does not exist, non-destructive testing of at least 10% of the length of the welded connections in each highly stressed area given below is to be conducted. This testing is to be carried out from both inside and outside of the tank, as appropriate, with thermal insulation removed, as necessary.

- fuel storage tank supports and anti-rolling/anti-pitching devices
- stiffening rings
- Y-connections between tank plates and longitudinal bulkheads of bilobe tanks
- swash bulkhead boundaries
- dome and sump connections to the tank shell
- foundations for fuel pumps, towers or ladders, etc.
- pipe connections

(*5) Appropriate pressure or vacuum testing and examinations for cold spots are to be carried out. Where the integrity of thermal insulation is verified by checking the bunker delivery note for the low-flashpoint fuel delivered, however, the examinations for cold spots may be omitted.

(*6) In cases where it is confirmed through the examination of records that the pressure relief valves have been opened for examination, adjusted, function tested and sealed at an interval not exceeding five *years*, general examinations of the pressure relief valves need only be carried out at Special Surveys.

(*7) In cases where it is confirmed through the examination of records that the pressure/vacuum relief valves, rupture disc or other pressure relief devices have been opened, examined, tested and readjusted at an interval not exceeding five *years*, respective general examinations of the pressure/vacuum relief valves, rupture disc or other pressure relief devices need only be carried out.

(*8) For systems whose continuous open-up examinations and performance testing since the previous Special Survey have been carried out in the presence of a Surveyor and whose test records are confirmed, visual examinations to the extent as far as practical may be carried out in lieu of the required testing.

(*9) For equipment that is overhauled at Planned Machinery Surveys, overhauling at Special Surveys may be replaced by visual examinations to the extent as far as practical.

Table B5.30 has been amended as follows.

Table B5.30 Interpretations of Rule Requirements for the Number and Location of Thickness Measurements for Bulk Carriers Built under **Part CSR-B** or **Part CSR-B&T**

Item	Interpretation	Reference
1 Selected plates on deck, tank top, bottom, double bottom and wind-and-water area	(1) «Selected» means at least a single point on one out of three plates, to be chosen as representative areas of average corrosion	
2 All deck, tank top and bottom plates and wind-and-water strakes	(1) At least two points on each plate to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion	
3 Transverse section	(1) Single side skin construction: A transverse section includes all longitudinal members (i.e., plating, longitudinals and girders, etc.) at the deck, side, bottom; inner bottom and hopper side plating and bottom plating in top wing tanks. (2) Double side skin construction: A transverse section includes all longitudinal members (i.e., plating, longitudinals and girders, etc.) at the deck, sides, bottom, inner bottom, hopper sides, inner sides and top wing inner sides.	**Fig B5.1**
4 All cargo hold hatch covers and coamings	(1) Including plates and stiffeners	**Fig. B5.2**
5 Transverse section of deck plating outside line of cargo hatch openings	(1) Two single points on each deck plate (to be taken either at each 1/4 extremity of the plate or at representative areas of average corrosion) between the ship sides and hatch coamings in the concerned transverse section	
6 All deck plating and underdeck structure inside line of hatch openings between cargo hold hatches	(1) «All deck plating» means at least two points on each plate to be taken either at each 1/4 extremity of the plate or at representative areas of average corrosion. "Under deck structure": at each short longitudinal girder: three points for web plating (fwd/middle/aft), one point for face plate, one point for web plating and one point for face plating of transverse beams in way. At each end of transverse beams, one point for web plating and one point for face plate	**Fig. B5.6**
7 Selected side shell frames in cargo holds of single side skin construction	(1) Includes side shell frames, upper and lower end attachments and adjacent shell plating. (2) 25% of frames: one out of four frames should preferably be chosen throughout the cargo hold length on each side. (3) 50% of frames: one out of two frames should preferably be chosen throughout the cargo hold length on each side. (4) «Selected frames» means at least 3 frames on each side of cargo holds	**Fig. B5.3**
8 Transverse frame in double skin tank of double side skin construction	---	**Fig. B5.1**
9 Transverse bulkheads in cargo holds	(1) Includes bulkhead plating, stiffeners and girders. Also includes internal structures of upper and lower stools, where fitted. Two selected bulkheads: one is to be the bulkhead between the two foremost cargo holds and the second may be chosen in another position	**Fig. B5.4**
10 One transverse bulkhead in each cargo hold	(1) This means that close-up surveys and related thickness measurements are to be performed on one side of the bulkhead; the side is to be chosen based on the outcome of the overall survey of both sides. In the event of doubt, the Surveyor may also require (possibly partial) close-up surveys on the other side	**Fig. B5.4**

Table B5.30 Interpretations of Rule Requirements for the Number and Location of Thickness Measurements for Bulk Carriers Built under **Part CSR-B** or **Part CSR-B&T** (Continued)

Item	Interpretation	Reference
11 Transverse bulkheads in one topside, hopper, double bottom ballast tank and side ballast tank (double side skin)	(1) Includes bulkhead and stiffening systems. (2) The ballast tank is to be chosen based on the history of ballasting among those prone to have the most severe conditions	**Fig. B5.5**
12 Transverse webs in ballast tanks	(1) Includes web plating, face plates, stiffeners and associated plating and longitudinals. (2) One of representative tanks of each type (i.e. topside or hopper or side tank) is to be chosen for in the forward part	**Fig. B5.1** **Fig. B5.3**

Table B5.31 has been amended as follows.

Table B5.31 Interpretations of Rule Requirements for the Number and Location of Thickness Measurements for Double Hull Oil Tankers Built under **Part CSR-T** or **Part CSR-B&T**

Item	Interpretation	Reference
1 Selected plates	(1) «Selected» means at least a single point on one out of three plates, to be chosen as representative areas of average corrosion.	
2 Deck, bottom plates and wind-and-water strakes	(1) At least two points on each plate to be taken either at each 1/4 extremity of plate or at representative areas of average corrosion.	
3 Transverse section	(1) Measurements to be taken on all longitudinal members (i.e., plating, longitudinals and girders, etc.) at the deck, side, bottom, longitudinal bulkheads, inner bottom and hopper. One point to be taken on each plate. Both web and flange to be measured on longitudinals, if applicable. (1) For tankers older than 10 years of age: ・Within 0.1 *D* (where *D* is the ship's moulded depth) of the deck and bottom at each transverse section to be measured, ・Every longitudinal and girder is to be measured on webs and face plates ・Every plate is to be measured at one point between longitudinals.	**Fig. B5.7**
4 Transverse rings (1) in cargo and ballast tanks	(1) At least two points on each plate in a staggered pattern and two points on the corresponding flange, where applicable. (2) Minimum 4 points on the first plate below deck. (3) Additional points in way of curved parts. (4) At least one point on each of two stiffeners between stringers / longitudinal girders.	**Fig. B5.8**
5 Transverse bulkheads in cargo tanks	(1) At least two points on each plate. Minimum 4 points on the first plate below main deck. (2) At least one point on every third stiffener to be taken between each stringer. (3) At least two points on each plate of stringers and girders, and two points on the corresponding flange. (4) Additional points in way of curved parts. (5)Two points of each diaphragm plate of stools (if fitted).	**Fig. B5.9**
6 Transverse bulkheads in ballast tanks	(1) At least 4 points on plates between stringers / longitudinal girders, or per plate if stringers / girders are not fitted. (2) At least two points on each plate of stringers and girders, and two points on the corresponding flange. (3) Additional points in way of curved parts. (4) At least one point on two stiffeners between each stringer / longitudinal girder.	**Fig. B5.10**
7 Adjacent structural members	(1) On adjacent structural members, one point per plate and one point on every third stiffener / longitudinal.	

(1) "Transverse rings" means all transverse material appearing in a cross-section of the ship's hull in way of a double bottom floor, vertical web and deck transverse

Chapter 6 DOCKING SURVEYS

Table B6.1 has been amended as follows.

Table B6.1 Requirements for Docking Surveys

Items	Examinations
1 Shell plating including keel plate, stem and stern frame	(1) Discontinuous structures, structural parts liable to excessive corrosion and openings in the shell are to be examined carefully. Grillage covers are to be removed where deemed necessary by the Surveyor.
2 Rudder	(1) The rudder is to be lifted or removed and visible parts of the rudder, rudder pintles, gudgeons, rudder stocks and couplings and stern frame are to be examined. Where applicable, a pressure test of the rudder may be required as deemed necessary by the Surveyor. The rudder bearing clearance is to be measured. The rudder may not require lifting or removal provided the Surveyor is satisfied with the condition of the rudder by measurement of the clearance.
3 Scupper, overboard discharges and sea inlets including distance pieces below freeboard deck, and valves and cocks on shell plating, sea chest or distance piece, and side thrusters	(1) The main parts of valves and cocks are to be opened up and examined. The bolts or studs fastening these mountings to the hull are to be examined. The valves and cocks may not require open-up examination at the discretion of the Surveyor provided they were opened up and found to be in good order at the last Docking Survey. In cases where consecutive In-water Surveys in lieu of Docking Surveys conducted in dry dock or on slipway may be applied with Administration approval, the open-up examination of valves and cocks required may be exempted at the discretion of the Society provided they were examined (including visual inspection by diver) and found to be in good order. (2) Side thrusters are to be visually examined for any damage which may affect the hull structure. (3) For ships fitted with exhaust gas cleaning systems, the internal condition of distance pieces of piping systems for washwater used in scrubber chambers is to be examined for damage.
4 Bush of stern tube bearing or shaft bracket bearing	(1) The wear down of the bearing or the clearance between the propeller shaft (Except in the case of azimuth thrusters which use roller bearings as the bearings for propeller shafts) or stern tube shaft and the bearing is to be measured and recorded.
5 Sealing devices for stern tube and shaft bracket bearing	(1) In the case of oil or freshwater lubricated stern tube bearings, the efficiency of the oil or freshwater gland is to be checked.
6 Propeller	(1) Propellers are to be examined. Where a controllable pitch propeller is fitted, the pitch control device is to be examined without dismantling.
7 Anchor, anchor chain, ropes, hose pipe, chain locker and cable clenches	(1) At the Docking Surveys carried out at the times specified in **1.1.3-1(4)(a)**, anchor and anchor chains are to be ranged and all chains and chain related equipment are to be verified and externally examined. In cases where In-water Surveys in lieu of Docking Surveys conducted in dry dock or on slipway may be applied at the times specified in **1.1.3-1(4)(a)**, anchors and anchor chains may not be required to be ranged and examined at the discretion of the Society provided they were examined (including visual inspection by diver) and found to be in good order. In such cases, anchors and anchor chains should be ranged and all chains and chain related equipment should be verified and externally examined at the next Docking Surveys conducted in dry dock or on slipway. At Special Survey No.2 and subsequent Special Surveys, the diameter of the anchor chain is to be measured. If the mean diameter of a link, at its most worn part, is reduced by 12% or more from its required nominal diameter, it is to be renewed.

Table B6.1 Requirements for Docking Surveys (Continued)

Items	Examinations
8 Tanks and spaces	~~-~~(1) The internal examination, close-up surveys and thickness measurements (if applicable and not already carried out) are to be carried out as stipulated below. ~~(i)~~(a) At Docking Surveys in the dry dock or on the slipway carried out in conjunction with Special Surveys or at the times specified in **4.1.1-2**., at least the portions below the light ballast water line of the cargo holds/tanks and water ballast tanks ~~(ii)~~(b) At Docking Surveys carried out at the times specified in **1.1.6-5** as far as practicable.
9 Installations for In-water Surveys	~~-~~(1) With regard to ships having the approval for conducting In-water Surveys based on the requirements in **6.1.2**, Surveyors are to confirm that the means and installations specified in **6.1.2-4** are in good condition.

Chapter 7 BOILER SURVEYS

Table B7.1 has been amended as follows.

Table B7.1 Requirements of Boiler Survey

Items	Examinations
1 Pressure parts of boilers	(1) To be internally examined with the manholes, cleaning holes and inspection holes dismantled. Where considered to be necessary for external examination by the Surveyor, the parts are to be examined to the Surveyor's satisfaction with the insulation around the parts removed.(2)
2 Superheaters, economizers and exhaust gas economizers	(1) To be examined internally and externally. For exhaust gas economizers of the shell type, all accessible welded joints are to be subject to a visual examination for cracking and non-destructive testing may be requested where deemed necessary by the Surveyor.(2)
3 Combustion parts of boilers and thermal oil heaters(1)	(1) The furnaces, combustion chambers, combustion gas chambers, etc. are internally examined with their doors opened.(2)
4 Valves and cocks	(1) The principal mountings and their fastening bolts or studs are to be opened up and examined.
5 Thickness of plates and tubes and size of stays	(1) To be measured where deemed necessary by the Surveyor.
6 Safety valves and relevant parts of boilers, superheaters and thermal oil heaters(1)	(1) The safety valves are to be adjusted under steam to a pressure not more than 103 % the approved working pressure after the open-up examination. The pressure gauge used for this adjustment is to be calibrated properly. The relieving gears of the valves are to be examined and tested to verify satisfactory operation. However, for exhaust gas economizers, if steam cannot be raised at port, the relief valves may be set by the chief engineer at sea, and the results recorded in the logbook for review by the Surveyor. (2) The general conditions of relief pipes for thermal oil heaters are to be examined. The popping pressure of safety valves fitted on thermal oil heaters is to be ascertained.
7 Safety devices, alarm devices and automatic combustion control devices	(1) These devices are to be tested in order to ascertain that they are in good working conditions after the above examinations.
8 Review of the records of the logbook	(1) Review of the following records since last boiler survey is to be carried out. ~~(1)~~(a) Operation ~~(2)~~(b) Maintenance ~~(3)~~(c) Repair history ~~(4)~~(d) Quality control of the feed water or thermal oil

Notes:

(1) Only applies to thermal oil heaters heated by fire, combustion gas or exhaust gas from machinery.

(2) When direct visual internal inspection is not feasible due to the limited size of the internal spaces, such as for small boilers and/or narrow internal spaces, this may be replaced by a hydrostatic pressure test or by alternative verifications as deemed appropriate by the Society.

Chapter 9 PLANNED MACHINERY SURVEYS

9.1 Planned Machinery Surveys

9.1.3 Planned Machinery Maintenance Scheme (PMS)*

Sub-paragraph -3 has been added as follows.

3 PMS management software is to be approved by the Society in accordance with **Annex 9.1.3 "Procedures for approval of PMS/CBM Management Software"**.

Paragraph 9.1.4 has been amended as follows.

9.1.4 Condition Based Maintenance Scheme (CBM)*

1 A shipowner (or ship management company) that has an established maintenance system may apply to adopt the method in which maintenance of machinery is carried out according to the results of condition monitoring and diagnosis, as specified in the following **(1)** to **(6)**, in place of the open-up surveys specified in **Table B9.1**.

((1) to (6) are omitted.)

2 CBM management software is to be approved by the Society in accordance with **Annex 9.1.3 "Procedures for approval of PMS/CBM Management Software"**.

Table B9.1 has been amended as follows.

Table B9.1 Open-up Surveys of Machinery and Equipment

Items	Examinations
1 Reciprocating internal combustion engines (main engine)	(1) Cylinder covers, cylinder liners, pistons (including piston pins and piston rods), crosshead pins and bearings, connecting rods, crank pins and their bearings, crank journals and their bearings, camshafts and their driving gears, turbo chargers, scavenge air pumps or blowers, air intercoolers, attached essential pumps (bilge, lubricating oil, fuel oil, cooling water) are to be opened up.
2 Steam turbines (main engine)	(1) Turbine rotors together with bearings, turbine casings, turbine and reduction gear couplings, nozzle valves and manoeuvring valves are to be opened up.
3 Gas turbines (main engine)	(1) The essential parts of gas turbines together with their associated equipment are to be opened up and examined.
4 Power transmission systems and shafting systems (except for those for which item 7 is applicable)	-(1) Reduction gears, reversing gears and clutch gears are to be opened up to the Surveyor's satisfaction, and the gears, shafts, bearings and couplings are to be examined. -(2) The essential parts of flexible couplings are to be opened up. -(3) The thrust shafts, intermediate shafts and their bearings (excluding the stern tube bearings, the shaft bracket bearings and the main bearings of waterjet propulsion systems) are to be examined by removing the upper bearing halves or their bearing metals and thrust pads and turning the shaft. -(4) The essential parts of other power transmission gears are to be subjected to open-up examinations to the Surveyor's satisfaction.
5 Auxiliary engines	-(1) Auxiliary engines driving generators (including emergency generators), auxiliary machinery essential for main propulsion and auxiliary machinery for manoeuvring and personnel safety are to be handled in accordance with the requirements applicable to main engines.
6 Water jet propulsion systems	-(1) Hydraulic pumps for steering actuating systems are to be opened up. -(2) Lubricating oil pumps are to be opened up. -(3) Coolers are to be opened up. -(4) Other items considered to be necessary by the Society are to be opened up.
7 Azimuth thrusters	=(1) For gears, gear shafts, shaft couplings, bearings and clutches for propulsion, these items are to be opened up as deemed necessary by the Surveyor so that they can be inspected. However, this may be carried out concurrently with the surveys specified in **Chapter 8**. =(2) For gears, gear shafts, shaft couplings and bearings for steering, these items are to be opened up as deemed necessary by the Surveyor so that they can be inspected. However, this may be carried out concurrently with the surveys specified in **Chapter 8**. =(3) Hydraulic pumps and hydraulic motors for azimuth steering gears are to be opened up. =(4) Lubricating oil pumps are to be opened up. =(5) Coolers are to be opened up. =(6) Other items considered to be necessary by the Society are to be opened up.

Table B9.1 Open-up Surveys of Machinery and Equipment (Continued)

Items	Examinations
8 Auxiliary machinery (except for those for which item 6 or 7 is applicable)	(1) The essential parts of the following auxiliary machinery are to be subjected to open-up examinations. (a) Air compressors, blowers (b) Cooling pumps (c) Fuel oil pumps (d) Lubricating oil pumps (e) Feed pumps, condensing pumps, drain pumps (f) Bilge pumps, ballast pumps, fire pumps (excluding those for emergency use) (g) Condensers, feed water heaters (h) Coolers (i) Oil heaters (j) Fuel oil tanks (k) Air reservoirs (including those for main, auxiliary, control, general service and emergency use) (l) Cargo piping systems (including bulk liquid cargo handling appliances as necessary) (m) Deck machinery (n) Distilling plants (for boilers used for driving steam turbines) (o) Other items considered to be applicable under the Planned Machinery Survey by the Society

Chapter 12 SURVEYS FOR MOBILE OFFSHORE DRILLING UNITS AND SPECIAL PURPOSE BARGES

Table B12.1 has been amended as follows.

Table B12.1 Requirements for Thickness Measurements for Self-elevating Units

Special Survey	Structural members subject to thickness measurements
1 Special Survey for units up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) Suspect areas throughout the unit (particular attention is to be paid to the legs in way of the splash zone).
2 Special Survey for units over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) Suspect areas throughout the unit. ~~2.~~(2) Legs in way of the splash zone. ~~3.~~(3) Special portions of structural members and primary structural members where wastage is evident. ~~4.~~(4) Representative locations of the upper hull deck and bottom plating. ~~5.~~(5) Representative locations of the interior of one preload (ballast) tank.
3 Special Survey for units over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) Suspect areas throughout the unit. ~~2.~~(2) Legs in way of the splash zone. ~~3.~~(3) Representative locations, throughout, of special portions of structural members and primary structural members. ~~4.~~(4) Leg well structure. ~~5.~~(5) Representative locations of deck, bottom and side shell plating of hull and mat. ~~6.~~(6) Interiors of at least two preload (ballast) tanks.
4 Special Survey for units over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) Suspect areas throughout the unit. ~~2.~~(2) Legs in way of the splash zone. ~~3.~~(3) Special portions of structural members and primary structural members. ~~4.~~(4) Leg well structure. ~~5.~~(5) Representative locations of deck, bottom and side shell plating of hull and mat. ~~6.~~(6) Substructure of derrick (as deemed necessary by the Surveyor). ~~7.~~(7) Representative locations of interior of all preload (ballast) tanks.

Note:

The definitions of special portions of structural members and primary structural members are according to **6.2.1, Part P**.

Table B12.2 has been amended as follows.

Table B12.2 Requirements for Thickness Measurements for Column-Stabilized Units

Special Survey	Structural members subject to thickness measurements
1 Special Survey for units up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) Suspect areas throughout the unit. ~~2.~~(2) Columns and bracings where wastage is evident in the splash zone.
2 Special Survey for units over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) Suspect areas throughout the unit. ~~2.~~(2) The following locations: ~~(1)~~(a) Representative locations of columns and bracings in the splash zone; and ~~(2)~~(b) Representative locations of interiors of the columns and bracings specified in **~~(1)~~(a)** above. ~~3.~~(3) Special portions of structural members and primary structural members where wastage is evident.
3 Special Survey for units over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) Suspect areas throughout the unit. ~~2.~~(2) Representative locations, throughout, of special portions of structural members and primary structural members. ~~3.~~(3) The following locations: ~~(1)~~(a) One transverse section (girth belt) of each of 2 columns and 2 bracings in the splash zone; and ~~(2)~~(b) The interiors of the columns and bracings specified in **~~(1)~~(a)**. ~~4.~~(4) Lower hulls in way of mooring lines where wastage is evident. ~~5.~~(5) One transverse section (girth belt) of each lower hull between one set of columns.
4 Special Survey for units over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) Suspect areas throughout the unit. ~~2.~~(2) Special portions of structural members and primary structural members. ~~3.~~(3) The following locations: ~~(1)~~(a) One transverse section (girth belt) of each of one-half of the columns and bracings in the splash zone; and ~~(2)~~(b) Interiors of the columns and bracings specified in **~~(1)~~(a)** (as deemed necessary by the Surveyor). ~~4.~~(4) Lower hulls in way of mooring lines where wastage is evident. ~~5.~~(5) One transverse section (girth belt) of each lower hull between one set of columns. ~~6.~~(6) Representative locations of the substructures of drilling derricks.

Notes:

(1) The definitions of special portions of structural members and primary structural members are according to **6.2.1, Part P**.

(2) A transverse section (girth belt) includes all continuous longitudinal members such as plating, longitudinals and girders at a given section of the unit.

Table B12.3 has been amended as follows.

Table B12.3 Requirements for Thickness Measurements for Ship-type and Barge-type Units

Special Survey	Structural members subject to thickness measurements
1 Special Survey for units up to 5 *years* of age (Special Survey No.1)	~~1.~~(1) Suspect areas throughout the unit.
2 Special Survey for units over 5 *years* and up to 10 *years* of age (Special Survey No.2)	~~1.~~(1) Suspect areas throughout the unit. ~~2.~~(2) The following locations: ~~(1)~~(a) One transverse section of deck plating abreast the moon pool opening within amidships 0.6*L*; ~~(2)~~(b) Interiors of the deck plating specified in ~~**(1)**~~**(a)** (as deemed necessary by the Surveyor); and ~~(3)~~(c) In addition to ~~**(1)**~~**(a)** and ~~**(2)**~~**(b)** above, where the unit is configured with side ballast tanks, the plating and internals of the tanks are also to be gauged in way of the section chosen. ~~3.~~(3) Moon pool boundary bulkhead plating.
3 Special Survey for units over 10 *years* and up to 15 *years* of age (Special Survey No.3)	~~1.~~(1) Suspect areas throughout the unit. ~~2.~~(2) The following locations: ~~(1)~~(a) Two transverse sections (girth belts) of deck, bottom and side plating abreast the moon pool and one hatch opening within amidships 0.6 *L*; ~~(2)~~(b) Interiors of the transverse sections specified in ~~**(1)**~~**(a)** (as deemed necessary by the Surveyor); and ~~(3)~~(c) In addition to ~~**(1)**~~**(a)** and ~~**(2)**~~**(b)** above, where the unit is configured with side ballast tanks, the plating and interiors of the tanks to be gauged in way of the required belts. Remaining internals are to be gauged as necessary by the Surveyor. ~~3.~~(3) Moon pool boundary bulkhead plating. ~~4.~~(4) Interiors of forepeak and after peak tanks as deemed necessary by the Surveyor.
4 Special Survey for units over 15 *years* of age (Special Survey No.4 and subsequent Special Surveys)	~~1.~~(1) Suspect areas throughout the unit. ~~2.~~(2) A minimum of three transverse sections (girth belts) of deck, bottom, side and longitudinal bulkhead plating in way of the moon pool and other areas within amidships 0.6*L* together with the interiors in way (including within perimeter ballast tanks, where fitted in way of belts). ~~3.~~(3) Moon pool boundary bulkhead plating. ~~4.~~(4) Interiors of forepeak and after peak tanks as deemed necessary by the Surveyor. ~~5.~~(5) Lowest strake of all transverse bulkheads in hold spaces. Remaining bulkhead plating to be gauged as deemed necessary by the Surveyor. ~~6.~~(6) All plates in two wind and water strakes, port and starboard, full length. ~~7.~~(7) All exposed main deck plating (full length) and all exposed first tier superstructure deck plating (poop, bridge and forecastle decks). ~~8.~~(8) All keel plating (full length) plus additional bottom plating as deemed necessary by the Surveyor, particularly in way of cofferdams and machinery spaces. ~~9.~~(9) Duct keel or pipe tunnel plating and interiors (as deemed by the Surveyor). ~~10.~~(10) Plating of sea chests. Shell plating in way of overboard discharges as deemed necessary by the Surveyor.

Notes:

(1) For units less than 100 *m* in length, the number of transverse sections required at Special Survey No. 3 may be reduced to one, and the number of transverse sections required at subsequent Special Surveys may be reduced to two.

(2) For units more than 100 *m* in length, thickness measurements of exposed deck plating within amidship 0.5 *L* may be required at Special Survey No.3.

Annex 2.1.4 has been added as follows.

Annex 2.1.4 PROCEDURES FOR ON-BOARD FUNCTION TEST OF FIXED FIRE DETECTION AND ALARM SYSTEM IN MACHINERY SPACES

An 1.1 General

An 1.1.1 Scope

These procedures apply to the on-board function test of the fixed fire detection and alarm system installed in machinery spaces specified in **7.4.1-1**, **Part R of the Rules**.

An 1.1.2 Test Timing

The on-board function test is to be conducted during the sea trial at normal continuous rating operation. However, this test may be carried out under conditions considered to be equivalent by the Society to actual ventilation conditions at sea.

An 1.2 Test Details

An 1.2.1 Mock Fire

Either one of the following is to be used as a mock fire at the test.

(1) Fire by burning liquid fuel

Fuel oil (Marine Diesel Oil or Heavy Fuel Oil) is ignited in a cylindrical steel container having a 200 *mm* diameter and 200 *mm* depth. The volume of fuel oil may be optional but is to be enough to complete the test. Where Heavy Fuel Oil is used, some Marine Diesel Oil may be mixed in for easy ignition. In order to prevent oil spillage due to pitch and roll of the ship or to restrict the height of the flame, rags steeped in the fuel oil may be used as the fuel source in the container.

(2) Fire by burning materials other than liquid fuel

Materials other than liquid fuel may be used for the mock fire, provided that the amount of heat release and smoke generation are confirmed to be equivalent to the liquid fuel in **(1)** above by placing the test device specified in *ISO* 9705 on top of the cylindrical container. Ignition of the mixture of lactose ($C_{12}H_{22}O_{11}$) and potassium chlorate ($KClO_3$) (40 *g* in weight each) is considered to be equivalent to the mock fire mentioned in **(1)**. The quantity of lactose and potassium chlorate may be modified according to the size of the machinery spaces.

An 1.2.2 Locations for Igniting Mock Fire

A mock fire is to be ignited at each place specified in **(1)** to **(5)** below.

The places shown in **(4)** and **(5)** may be exempted, if deemed appropriate by the Surveyor after taking into account factors such as the arrangement of detectors and the ventilation condition.

(1) Near exhaust gas manifolds of reciprocating internal combustion engines used as main propulsion machinery

(2) Near exhaust gas manifolds of reciprocating internal combustion engines driving main generators

(3) Near fuel oil burners of boilers

(4) Near fuel oil purifiers

(5) Near fuel oil burners of incinerators

An 1.2.3 Elapsed Time until Detection

The mock fire is to be detected within 3 *minutes* from the time when the fire or smoke is confirmed by eyesight.

An 1.3 Other Items

An 1.3.1 Requirements when Detection Fails

Where the fire has not been detected within the required time, more detectors are to be installed and/or the current detectors are to be alternatively arranged by tracing the smoke flow during the on-board function test and deciding the optimum position according to either of the following methods. In this case, the on-board function test of these detectors is not required after their installation and/or rearrangement, provided that performance tests are carried out on the detectors individually.

However, where it is difficult to decide the location for additional installation and/or alternative arrangement of the detectors, the on-board function test is to be carried out during the sea trial after the installation and/or rearrangement.

(1) Using removable/portable fire detectors
(2) Verifying the smoke flow/accumulation by eyesight

An 1.3.2 Omission of Test

Notwithstanding **An 1.2.2** above, the on-board function test may be omitted, provided that the effectiveness of the fire detection and alarm system in the engine room has been confirmed by a sister ship that has the same factors affecting fire detection. Factors affecting fire detection refers to the following.

(1) Size, shape and structure arrangement (girders, bulkheads, frames, etc. to affect the smoke flow) of the engine room
(2) Arrangement and type of the fire detectors
(3) Arrangement of ventilation ducts of the engine room
(4) Kind, type and arrangement of machinery installations (main engines, generator engines, boilers, ventilators, flammable oil piping, hot surfaces, etc.)

Annex 2.1.5 has been added as follows.

Annex 2.1.5 TESTING PROCEDURES OF WATERTIGHT COMPARTMENTS

Chapter 1 SHIPS SUBJECT TO *SOLAS CONVENTION*

An 1.1 General

An 1.1.1 General

1 The test procedures specified in this Annex are to confirm the watertightness of tanks and watertight boundaries as well as the structural adequacy of tanks which make up the watertight subdivisions of ships. These procedures may also be applied to verify the weathertightness of structures and shipboard outfitting. The tightness of all tanks and watertight boundaries of ships being newly constructed and ships undergoing major conversions or major repairs is to be confirmed by these test procedures prior to the delivery of the ship. "Major repairs" refers to repairs affecting the tightness of watertight boundaries.

2 Testing procedures of watertight compartments for ships subject to *SOLAS Convention* (including ships subject to **Part CSR-B&T**) are to be carried out in accordance with **Chapter 1**, unless:

(1) the shipyard provides documentary evidence of the shipowner's agreement to a request to the Flag Administration for an exemption from the application of *SOLAS Chapter II-1*, *Regulation 11*, or for an equivalency agreeing that the content of **Chapter 2 of Annex 2.1.5 "Testing Procedures of Watertight Compartments"** is equivalent to *SOLAS Chapter II-1*, *Regulation 11*; and

(2) the above-mentioned exemption/equivalency has been granted by the responsible Flag Administration.

An 1.2 Application

An 1.2.1 Application

1 All gravity tanks and other boundaries required to be watertight or weathertight are to be tested in accordance with this Procedure and proven to be tight and structurally adequate as follows. "Gravity tanks" refers to a tank that is subject to vapour pressure not greater than 0.07*MPa*.

(1) Gravity Tanks for their tightness and structural adequacy

(2) Watertight Boundaries Other Than Tank Boundaries for their watertightness

(3) Weathertight Boundaries for their weathertightness

2 The testing of structures not listed in **Table An 1.4-1** or **Table An 1.4-2** is to be specially considered.

An 1.3 Test types and Definitions

An 1.3.1 Tests

1 The following two types of tests are specified in this requirement:

(1) Structural Test

A test to verify the structural adequacy of tank construction. This may be a hydrostatic test or, where the situation warrants, a hydropneumatic test.

(2) Leak Test

A test to verify the tightness of a boundary. Unless a specific test is indicated, this may be a hydrostatic/hydropneumatic test or an air test. A hose test may be considered an acceptable form of leak test for certain boundaries, as indicated by **Table An 1.4-1**, **Footnote 3**.

2 The definition of each test type is as indicated by **Table An 1.3.1**.

Table An 1.3.1 Test Definition of Each Test Type

Hydrostatic Test: (Leak and Structural)	A test wherein a space is filled with a liquid to a specified head.
Hydropneumatic Test: (Leak and Structural)	A test combining a hydrostatic test and an air test, wherein a space is partially filled with a liquid and pressurized with air.
Hose Test: (Leak)	A test to verify the tightness of a joint by a jet of water with the joint visible from the opposite side.
Air Test: (Leak)	A test to verify tightness by means of air pressure differential and leak indicating solution. It includes tank air test and joint air tests, such as compressed air fillet weld tests and vacuum box tests.
Compressed Air Fillet Weld Test: (Leak)	An air test of fillet welded tee joints wherein leak indicating solution is applied on fillet welds.
Vacuum Box Test: (Leak)	A box over a joint with leak indicating solution applied on the welds. A vacuum is created inside the box to detect any leaks.
Ultrasonic Test: (Leak)	A test to verify the tightness of the sealing of closing devices such as hatch covers by means of ultrasonic detection techniques.
Penetration Test: (Leak)	A test to verify that no visual dye penetrant indications of potential continuous leakages exist in the boundaries of a compartment by means of low surface tension liquids (i.e. dye penetrant test).

An 1.4 Test Procedures

An 1.4.1 General

Tests are to be carried out in the presence of a Surveyor at a stage sufficiently close to the completion of work with all hatches, doors, windows, etc. installed and all penetrations including pipe connections fitted, and before any ceiling and cement work is applied over the joints. Specific test requirements are given in **An 1.4.4** and **Table An1.4-1**. For the timing of the application of coating and the provision of safe access to joints, see **An 1.4.5**, **An 1.4.6** and **Table An1.4-3**.

An 1.4.2 Structural Test Procedures

1 Type and time of test

Where a structural test is specified in **Table An1.4-1** or **An1.4-2**, a hydrostatic test in accordance with **An1.4.4-1** will be acceptable. Where practical limitations (strength of building berth, light density of liquid, etc.) prevent the performance of a hydrostatic test, a hydropneumatic test in accordance with **An1.4.4-2** may be accepted instead.

A hydrostatic test or hydropneumatic test for the confirmation of structural adequacy may be carried out while the ship is afloat, provided the results of a leak test are confirmed to be satisfactory before the ship is afloat.

2 Testing schedule for new construction or major structural conversion is as follows.

(1) Tanks which are intended to hold liquids, and which form part of the watertight subdivision of the ship, are to be tested for tightness and structural strength as indicated in **Table An1.4-1** and **Table An1.4-2**.

(2) The tank boundaries are to be tested from at least one side. The tanks for structural test are to be selected so that all representative structural members are tested for the expected tension and compression.

(3) For the watertight boundaries of spaces other than tanks structural testing may be exempted, provided that the water-tightness of boundaries of exempted spaces is verified by leak tests and inspections. Structural testing may not be exempt and the requirements for structural testing of tanks in **(1)** and **(2)** above shall apply, for ballast holds, chain lockers and a representative cargo hold if intended for in-port ballasting.

An 1.4.3 Leak Test Procedures

1 For the leak tests specified in **Table An1.4-1**, tank air tests, compressed air fillet weld tests, vacuum box tests in accordance with **An 1.4.4-4** through **An 1.4.4-6**, or their combination, will be acceptable. Hydrostatic or hydropneumatic tests may also be accepted as leak tests provided that **An 1.4.5**, **An 1.4.6** and **An 1.4.7** are complied with. Hose tests will also be acceptable for such locations as specified in **Table An1.4-1**, **Footnote 3**, in accordance with **An 1.4.4-3**.

2 The application of the leak test for each type of welded joint is specified in **Table An1.4-3**.

3 Air tests of joints may be carried out in the block stage provided that all work on the block that may affect the tightness of a joint is completed before the test. See also **An 1.4.5-1** for the application of final coatings and **An 1.4.6** for the safe access to joints and the summary in **Table An1.4-3**.

An 1.4.4 Test Methods

1 Hydrostatic test

Unless another liquid is approved, hydrostatic tests are to consist of filling the space with fresh water or sea water, whichever is appropriate for testing, to the level specified in **Table An1.4-1** or **Table An1.4-2**. See also **An 1.4.7**.

In cases where a tank is designed for cargo densities greater than sea water and testing is with fresh water or sea water, the testing pressure height is to simulate the actual loading for those greater cargo densities as far as practicable.

All external surfaces of the tested space are to be examined for structural distortion, bulging and buckling, other related damage and leaks.

2 Hydropneumatic test

Hydropneumatic tests, where approved, are to be such that the test condition, in conjunction with the approved liquid level and supplemental air pressure, will simulate the actual loading as far as practicable. The requirements and recommendations for tank air tests in **-4** will also apply to hydropneumatic tests. See also **An1.4.7**.

All external surfaces of the tested space are to be examined for structural distortion, bulging and buckling, other related damage and leaks.

3 Hose test

Hose tests are to be carried out with the pressure in the hose nozzle maintained at least at 0.2 *MPa* during the test. The nozzle is to have a minimum inside diameter of 12 *mm* and be at a perpendicular distance from the joint not exceeding 1.5 *m*. The water jet is to impinge directly upon the weld.

Where a hose test is not practical because of possible damage to machinery, electrical equipment insulation or outfitting items, it may be replaced by a careful visual examination of welded connections, supported where necessary by means such as a dye penetrant test or ultrasonic leak test or the equivalent.

4 Tank air test

All boundary welds, erection joints and penetrations, including pipe connections, are to be examined in accordance with approved procedure and under a stabilized pressure differential above

atmospheric pressure not less than 0.015 *MPa*, with a leak indicating solution such as soapy water/detergent or a proprietary brand applied.

A U-tube with a height sufficient to hold a head of water corresponding to the required test pressure is to be arranged. The cross sectional area of the U-tube is not to be less than that of the pipe supplying air to the tank. Arrangements involving the use of two calibrated pressure gauges to verify the required test pressure may be accepted taking into account the provisions in *F5.1* and *F7.4* of *IACS Recommendation No.140*, "Recommendation for Safe Precautions during Survey and Testing of Pressurized Systems".

A double inspection is to be made of tested welds. The first is to be immediately upon applying the leak indication solution; the second is to be after approximately four or five minutes in order to detect those smaller leaks which may take time to appear.

5 Compressed air fillet weld test

In this air test, compressed air is injected from one end of a fillet welded joint and the pressure verified at the other end of the joint by a pressure gauge. Pressure gauges are to be arranged so that an air pressure of at least 0.015 *MPa* can be verified at each end of all passages within the portion being tested.

Note: Where a leak test is required for fabrication involving partial penetration welds, a compressed air test is also to be applied in the same manner as to fillet weld where the root face is large.

6 Vacuum box test

A box (vacuum testing box) with air connections, gauges and an inspection window is placed over the joint with a leak indicating solution applied to the weld cap vicinity. The air within the box is removed by an ejector to create a vacuum of 0.020 – 0.026 *MPa* inside the box.

7 Ultrasonic test

An ultrasonic echo transmitter is to be arranged inside of a compartment and a receiver is to be arranged on the outside. The watertight/weathertight boundaries of the compartment are scanned with the receiver in order to detect an ultrasonic leak indication. A location where sound is detectable by the receiver indicates a leakage in the sealing of the compartment.

8 Penetration test

A test of butt welds or other weld joints uses the application of a low surface tension liquid at one side of a compartment boundary or structural arrangement. If no liquid is detected on the opposite sides of the boundaries after the expiration of a defined period of time, this indicates tightness of the boundaries. In certain cases, a developer solution may be painted or sprayed on the other side of the weld to aid leak detection.

9 Other test

Other methods of testing may be considered by the Society upon submission of full particulars prior to the commencement of testing.

An 1.4.5 Application of Coating

1 Final coating

For butt joints welded by an automatic process, the final coating may be applied any time before the completion of a leak test of spaces bounded by the joints, provided that the welds have been carefully inspected visually to the satisfaction of the Surveyor.

Surveyors reserve the right to require a leak test prior to the application of final coating over automatic erection butt welds.

For all other joints, the final coating is to be applied after the completion of the leak test of the joint. See also **Table An 1.4-3**.

2 Temporary coating

Any temporary coating which may conceal defects or leaks is to be applied at the time as specified for the final coating (see **-1** above). This requirement does not apply to shop primer.

An 1.4.6 Safe Access to Joints

For leak tests, safe access to all joints under examination is to be provided. See also **Table An 1.4-3**.

An 1.4.7 Hydrostatic or Hydropneumatic Tightness Test

In cases where the hydrostatic or hydropneumatic tests are applied instead of a specific leak test, examined boundaries must be dew-free, otherwise small leaks are not visible.

Table An 1.4-1 Test Requirements for Tanks and Boundaries

	Tank or boundary to be tested	Test type	Test head or pressure	Remarks
1	Double bottom tanks[*4]	Leak and structural[*1]	The greater of - top of the overflow, - to 2.4 *m* above top of tank[*2], or - to bulkhead deck	
2	Double bottom voids[*5]	Leak	See **An 1.4.4-4** through **-6**, as applicable	including pump room double bottom and bunker tank protection double hull required by **Part 3 of the Rules for Marine Pollution Prevention Systems**
3	Double side tanks	Leak and structural[*1]	The greater of - top of the overflow, - to 2.4 *m* above top of tank[*2], or - to bulkhead deck	
4	Double side voids	Leak	See **An 1.4.4-4** through **-6**, as applicable	
5	Deep tanks other than those listed elsewhere in this table	Leak and structural[*1]	The greater of - top of the overflow, or - to 2.4 *m* above top of tank[*2]	
6	Cargo oil tanks	Leak and structural[*1]	The greater of - top of the overflow, - to 2.4 *m* above top of tank[*2], or - to top of tank[*2] plus setting of any pressure relief valve	
7	Ballast hold of bulk carriers	Leak and structural[*1]	Top of cargo hatch coaming	
8	Peak tanks	Leak and structural[*1]	The greater of - top of the overflow, or - to 2.4 *m* above top of tank[*2]	After peak to be tested after installation of stern tube
9	.1 Fore peak spaces with equipment	Leak	See **An 1.4.4-3** through **-6**, as applicable	
	.2 Fore peak voids	Leak	See **An 1.4.4-4** through **-6**, as applicable	
	.3 Aft peak spaces with equipment	Leak	See **An 1.4.4-3** through **-6**, as applicable	
	.4 Aft peak voids	Leak	See **An 1.4.4-4** through **-6**, as applicable	After peak to be tested after installation of stern tube
10	Cofferdams	Leak	See **An 1.4.4-4** through **-6**, as applicable	
11	.1 Watertight bulkheads	Leak[*8]	See **An 1.4.4-3** through **-6**, as applicable[*7]	
	.2 Superstructure end bulkheads	Leak	See **An 1.4.4-3** through **-6**, as applicable	

Table An 1.4-1 Test Requirements for Tanks and Boundaries(Continued)

	Tank or boundary to be tested	Test type	Test head or pressure	Remarks
12	Watertight doors below freeboard or bulkhead deck	Leak[*6,7]	See **An 1.4.4-3** through **-6**, as applicable	
13	Double plate rudder blades	Leak	See **An 1.4.4-4** through **-6**, as applicable	
14	Shaft tunnels clear of deep tanks	Leak[*3]	See **An 1.4.4-3** through **-6**, as applicable	
15	Shell plating	Leak[*3]	See **An 1.4.4-3** through **-6**, as applicable	For shell plating of the areas listed in item 1 through item 10, refer to the corresponding item
16	Shell doors	Leak[*3]	See **An 1.4.4-3** through **-6**, as applicable	
17	Weathertight hatch covers and closing appliances	Leak[*3.7]	See **An 1.4.4-3** through **-6**, as applicable	Hatch covers closed by tarpaulins and battens excluded
18	Dual purpose tanks/dry cargo hatch covers	Leak[*3,7]	See **An 1.4.4-3** through **-6**, as applicable	In addition to structural test in item 6 or 7
19	Chain lockers	Leak and structural[*1]	Top of chain pipe	
20	L.O. sump. tanks and other similar tanks/spaces under main engines	Leak[*9]	See **An 1.4.4-3** through **-6**, as applicable	
21	Ballast ducts	Leak and structural[*1]	The greater of - ballast pump maximum pressure, or - setting of any pressure relief valve	
22	Fuel Oil Tanks	Leak and structural[*1]	The greater of - top of the overflow, - to 2.4 *m* above top of tank[*2], or - to top of tank[*2] plus setting of any pressure relief valves, or - to bulkhead deck	

Notes:

1 Refer to section **An 1.4.2-2**

2 The top of a tank is the deck forming the top of the tank, excluding any hatchways.

3 Hose Test may also be considered as a medium of the test. See **An 1.3.1-2**.

4 Including tanks arranged in accordance with the provisions of **6.1.1-3, Part C of the Rules**.

5 Including duct keels and dry compartments arranged in accordance with the provisions of **6.1.1-3, Part C of the Rules**, and/or oil fuel tank protection and pump room bottom protection arranged in accordance with the provisions of **1.2.3** and **3.2.5, Part 3 of the Rules for Marine Pollution Prevention Systems** respectively.

6 Where water tightness of a watertight door has not been confirmed by prototype test, testing by filling watertight spaces with water is to be carried out. See **13.3.3-1, Part C of the Rules**.

7 As an alternative to the hose testing, other testing methods listed in **An 1.4.4-7** through **-9** may be applicable subject to adequacy of such testing methods being verified. For watertight bulkheads (item 11.1) alternatives to the hose testing may only be used where a hose test is not practicable.

8 A "Leak and structural test", see **An 1.4.2-2** is to be carried out for a representative cargo hold if intended for in-port ballasting. The filling level requirement for testing cargo holds intended for in-port ballasting is to be the maximum loading that will occur in-port as indicated in the loading manual.

9 Where L.O. sump tanks and other similar spaces under main engines intended to hold liquid form part of the watertight subdivision required to satisfy the damage stability requirements of the ship, they are to be tested as per the requirements of Item 5, Deep tanks other than those listed elsewhere in this table.

10 Tests of piping systems in each part of the ship are to be carried out as specified in **12.6, 13.17**, and **14.6, Part D of the Rules**.

Table An 1.4-2 Additional Test Requirements for Special Service Ships/Tanks

	Type of Ship/Tank	Structures to be tested	Type of Test	Test Head or Pressure	Remarks
1	Liquefied gas carriers	Integral tanks	Leak and structural	Refer to **Part N of the Rules**	
		Hull structure supporting membrane or semi-membrane tanks	Refer to **Part N of the Rules**	Refer to **Part N of the Rules**	
		Independent tanks type A	Refer to **Part N of the Rules**	Refer to **Part N of the Rules**	
		Independent tanks type B	Refer to **Part N of the Rules**	Refer to **Part N of the Rules**	
		Independent tanks type C	Refer to **Part N of the Rules**	Refer to **Part N of the Rules**	
2	Edible liquid tanks	Independent tanks	Leak and structural[*1]	The greater of - top of the overflow, or - to 0.9 *m* above top of tank[*2]	
3	Chemical carriers	Integral or independent cargo tanks	Leak and structural[*1,4]	The greater of - to 2.4 *m* above top of tank[*2], or - to top of tank[*2] plus setting of any pressure relief valve	Where a cargo tank is designed for the carriage of cargoes with specific gravities larger than 1.0, an appropriate additional head is to be considered[*3]

Notes:

1 Refer to Section **An 1.4.2-2**.

2 Top of tank is deck forming the top of the tank excluding any hatchways.

3 For gravity tanks that are to be loaded with cargoes having a cargo density exceeding 1.0, a hydrostatic test is to be carried out with a head of water to the height obtained from the following formula above the top of the tank.

$$\frac{H}{2}(\gamma - 1) + 2.4 \ (m)$$

H: Vertical distance measured from the lower edge of the bulkhead plate of the tank to the top of the tank (*m*)

γ: Density of cargoes loaded in the tank.

Where *L* exceeds 150 *m*, or *H* is exceptionally large in comparison with *L*, the manner of the hydrostatic test is to be considered by the Society.

4 For pressure tanks, these tests are to be carried out in accordance with **4.23.6, Part N of the Rules**. In applying **4.23.6, Part N of the Rules**, "design vapour pressure" is to be read as "design pressure."

Table An 1.4-3 Application of Leak Test, Coating and Provision of Safe Access for Type of Welded Joints

Type of welded joints		Leak test	Coating[*1]		Safe Access[*2]	
			Before leak test	After leak test but before structural test	Leak test	Structural test
Butt	Automatic	Not required	Allowed[*3]	*N/A*	Not required	Not required
	Manual or Semi-automatic[*4]	Required	Not allowed	Allowed	Required	Not required
Fillet	Boundary including penetrations	Required	Not allowed	Allowed	Required	Not required

Notes:

1 Coating refers to internal (tank/hold coating), where applied, and external (shell/deck) painting. It does not refer to shop primer.

2 Temporary means of access for verification of the leak test.

3 The condition applies provided that the welds have been carefully inspected visually to the satisfaction of the Surveyor.

4 Flux Core Arc Welding (FCAW) semiautomatic butt welds need not be tested provided that careful visual inspections show continuous uniform weld profile shape, free from repairs, and the results of NDE testing show no significant defects.

Chapter 2 SHIPS OTHER THAN THOSE SUBJECT TO *SOLAS CONVENTION* AS SPECIFIED IN CHAPTER 1

An 2.1 General

An 2.1.1 General

1 The test procedures specified in this Annex are to confirm the watertightness of tanks and watertight boundaries as well as the structural adequacy of tanks which make up the watertight subdivisions of ships. These procedures may also be applied to verify the weathertightness of structures and shipboard outfitting. The tightness of all tanks and watertight boundaries of ships being newly constructed and ships undergoing major conversions or major repairs is to be confirmed by these test procedures prior to the delivery of the ship. "Major repairs" refers to repairs affecting the tightness of watertight boundaries.

2 Testing procedures of watertight compartments are to be carried out in accordance with **Chapter 2 of Annex 2.1.5 "Testing Procedures of Watertight Compartments"** for ships not subject to *SOLAS Convention* and ships subject to *SOLAS Convention* (including ships subject to **Part CSR-B&T**) for which:

(1) the shipyard provides documentary evidence of the shipowner's agreement to a request to the Flag Administration for an exemption from the application of *SOLAS Chapter II-1, Regulation 11*, or for an equivalency agreeing that the content of **Chapter 2 of Annex 2.1.5 "Testing Procedures of Watertight Compartments"** is equivalent to *SOLAS Chapter II-1, Regulation 11*; and

(2) the above-mentioned exemption/equivalency has been granted by the responsible Flag Administration.

An 2.2 Application

An 2.2.1 Application

1 Testing procedures are to be carried out in accordance with the requirements of **Chapter 1** of this Annex in association with the following alternative procedures specified in **-2** to **-6** for **An 1.4.2-2** and **Table An1.4-1**.

2 The tank boundaries are to be tested from at least one side. The tanks for structural test are to be selected so that all representative structural members are tested for the expected tension and compression.

3 Structural tests are to be carried out for at least one tank of a group of tanks having structural similarity (i.e. same design conditions, alike structural configurations with only minor localised differences determined to be acceptable by the attending Surveyor) on each vessel provided all other tanks are tested for leaks by an air test. The acceptance of leak testing using an air test instead of a structural test does not apply to cargo space boundaries adjacent to other compartments in tankers and combination carriers or to the boundaries of tanks for segregated cargoes or pollutant cargoes in other types of ships.

4 Additional tanks may require structural testing if found necessary after the structural testing of the first tank.

5 Where the structural adequacy of the tanks of a vessel were verified by the structural testing required in **Table An1.4-1** of **Chapter 1**, subsequent vessels in the series (i.e. sister ships built from the same plans at the same shipyard) may be exempted from structural testing of tanks, provided

that:

(1) Water-tightness of boundaries of all tanks is verified by leak tests and thorough inspections are carried out.

(2) Structural testing is carried out for at least one tank of each type among all tanks of each sister vessel.

(3) Additional tanks may require structural testing if found necessary after the structural testing of the first tank or if deemed necessary by the attending Surveyor.

For cargo space boundaries adjacent to other compartments in tankers and combination carriers or boundaries of tanks for segregated cargoes or pollutant cargoes in other types of ships, the provisions of **-3** above are to apply in lieu of preceding **(2)**.

6 Sister ships built (i.e. keel laid) two years or more after the delivery of the last ship of the series, may be tested in accordance with **-5** above at the discretion of the Society, provided that:

(1) general workmanship has been maintained (i.e. there has been no discontinuity of shipbuilding or significant changes in the construction methodology or technology at the yard, shipyard personnel are appropriately qualified and demonstrate an adequate level of workmanship as determined by the Society) and:

(2) an NDT plan is implemented and evaluated by the Society for the tanks not subject to structural tests. Shipbuilding quality standards for the hull structure during new construction are to be reviewed and agreed during the kick-off meeting. Structural fabrication is to be carried out in accordance with *IACS Recommendation No.47*, "*Shipbuilding and Repair Quality Standard*", *JSQS* or a recognised fabrication standard which has been accepted by the Society prior to the commencement of fabrication/construction. The work is to be carried out in accordance with the Rules and under survey of the Society.

Annex 2.3.1-1 has been added as follows.

Annex 2.3.1-1 TEST OF SHIP MANOEUVRABILITY

An 1 Guidance for the Test of Ship Manoeuvrability

An 1.1 General Requirements

An 1.1.1 Terminology

1 Length of ship is the distance defined in **2.1.2, Part A of the Rules**.

2 Midship point of ship is the point on the centre line of a ship at the midway of the length of ship.

3 Fore draught (T_f) is the draught at the forward perpendicular.

4 Aft draught (T_a) is the draught at the aft perpendicular.

5 Mean draught (T_m) is defined as $T_m = (T_f + T_a)/2$.

6 Trim (τ) is defined as $\tau = (T_a - T_f)$.

7 Δ is the full load displacement of the ship (*tonnes*).

8 Standard conditions are the ship conditions that satisfy the requirements in **An 1.2.1-1.(1)** and **An 1.2.1-2(1)**.

9 The test speed is the ship speed that is required to perform the tests of ship manoeuvrability specified in this Guidance. This speed is to be a speed of at least 90% of the ship speed corresponding to not less than 95% of the maximum continuous revolutions of the main engine.

(Note) In *IMO Res. MSC. 137* (*76*), the test speed is defined as a speed of at least 90% of the ship speed corresponding to 85% of the maximum engine output.

10 Advance (used in the turning test) is the distance travelled in the direction of the original course by the midship point from the position where the rudder order is given, to the position where the heading has changed 90 *degrees* from the original course.

11 Tactical diameter (used in the turning test) is the distance travelled by the midship point from the position where the rudder order is given to the position where the heading has changed 180 *degrees* from the original course. It is measured in the direction perpendicular to the original heading of the ship.

12 Transfer (used in the turning test) is the distance travelled by the midship point from the position where the rudder order is given to the position where the heading has changed 90 *degrees* from the original course. It is measured in the direction perpendicular to the original heading of the ship.

13 Overshoot angle is the additional heading deviation experienced by the ship after the rudder angle change is executed the second or third time in the zigzag test. See **Fig. 1.4.5-4**.

14 Track reach (used in the stopping test) is the distance along the path described by the midship point measured from the position where the order for full astern is given to the position where the ship stops in the water.

15 Stopping distance (used in the stopping test) is the distance travelled by the midship point from the position where the order for full astern is given, to the position where the ship stops in the water. It is measured in the direction of the original heading of the ship.

16 Lateral deviation (used in the stopping test) is the distance travelled by the midship point measured from the position where the order for full astern is given, to the position where the ship

stops in the water. It is measured in the direction perpendicular to the original heading of the ship.

An 1.2 Test Conditions

An 1.2.1 Condition of Ship

1 Loaded Condition

(1) Unless specified otherwise, tests of ship manoeuvrability are to be carried out in full load condition. "Full load condition" referred to in this Guidance means that the ship is loaded to within 5% of the full load draught.

(2) Notwithstanding **(1)**, where the tests of ship manoeuvrability cannot be carried out in full load condition, these tests may be carried out in an appropriately loaded condition such as ballast condition. However, these tests should be carried out as close to full load condition as possible.

2 Trim Condition

(1) Unless specified otherwise, tests of ship manoeuvrability are to be carried out in even trim condition. "Even trim condition" referred to in this Guidance means that the ship's trim is within 5% of the full load draught from even keel.

(2) Notwithstanding **(1)**, where the tests of ship manoeuvrability cannot be carried out in even trim condition, these tests may be carried out with a deeper aft draught in order to fully submerge the propeller.

An 1.2.2 Sea Area for Testing

1 Sea Area for Testing

(1) Tests of ship manoeuvrability are to be carried out preferably in deep, unconfined but sheltered sea. The water depth is to be more than 4 times the mean draught of the ship.

An 1.2.3 Environmental Condition

1 Environmental Condition

(1) Tests of ship manoeuvrability are to be carried out preferably in the calmest possible weather conditions. The tests should be conducted in conditions preferably within the following limits.

(a) Winds not exceeding 5 on the Beaufort scale

(b) Waves not exceeding a sea state of

(c) Uniform current only

(d) Visibility good (such as no fog)

An 1.3 Preparation for Tests of Ship Manoeuvrability

An 1.3.1 General

1 Measurement of Ship's Draught

(1) Necessary data such as draught of ship and density of sea water are to be measured in order to ascertain the loaded condition and ship's trim before tests are carried out.

(2) Values such as displacement, wetted surface area, and block coefficient (C_b) are to be determined by the hydrostatic curves or hydrostatic tables from the measurements taken.

An 1.4 Tests of Ship Manoeuvrability

An 1.4.1 General

1 Heading Direction

Where the tests of ship manoeuvrability specified in **An 1.4.2** to **An 1.4.6** are to be carried out, the ship is preferably to run upwind for the approach.

2 Control of Main Engines

The Engine control setting is to be kept constant during the trial except when it is required to be changed.

3 Test Speed

In order to obtain a stable test speed as defined in **An 1.1.2-9**, the ship is to maintain a straight course for at least 2 *minutes* preceding the test by keeping the main engine constant and the rudder at a minimum angle.

4 Pre-test Measurements

(1) The following items are to be measured before the tests specified in **An 1.4.2** to **An 1.4.6** are carried out.

(a) Environmental conditions (Wind: wind is measured by a wind indicator; Wave: wave height, wave period and wave direction are measured by visual observation; and Current: current estimated by a tide table if available may be used)

(b) Ship conditions (draught, trim and displacement corresponding to the draught)

However, where the ship condition has not changed from when the measurements were taken in **An 1.3.1-1** or is capable of being calculated from factors such as fuel and water consumption, measurement of the ship condition may be dispensed with.

(c) Water depth of the sea area where tests are conducted

An 1.4.2 Turning Test

1 General

(1) The turning test is a test to verify the ship's turning ability.

(2) This test includes both the right turning test and left turning test.

2 Testing Method

(1) While the ship is running ahead at test speed, the ship is steered to the maximum rudder angle (this angle need not exceed 35 *degrees*). The rudder angle is kept until the ship turns 360 *degrees*.

(2) Where deemed necessary as a result of considering the effects of wind, waves or currents; the turning test may be continued until the ship turns 720 *degrees*.

3 Measurement Method

(1) The ship speed and/or turning rate as well as the elapsed time are measured when the heading angle reaches 0, 5, 15, 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330, and 360 *degrees*.

(2) Where the ship continues for a 720-*degree* turn, the measurements specified in **(1)** are taken every 30 *degrees* after the 360-*degree* turn is made.

(3) Where a differential global positioning system (hereinafter referred to as "DGPS") or doppler log is used for measurement, this equipment is to be appropriately calibrated, and the ship's position, ship speed and elapsed time at each heading angle are measured.

4 Measurement Items and Report

(1) The following items are to be measured. (*See* **Fig. An 1.4.2**)

(a) Ship speed at the beginning and the end of the test

(b) Advance (1) and 3) in the Figure), tactical diameter (2) and 4) in the Figure) and transfer (5) and 6) in the Figure)

Where the ship continues for a 720-*degree* turn, the advance, tactical diameter and transfer of the first and second turns are to be measured separately.

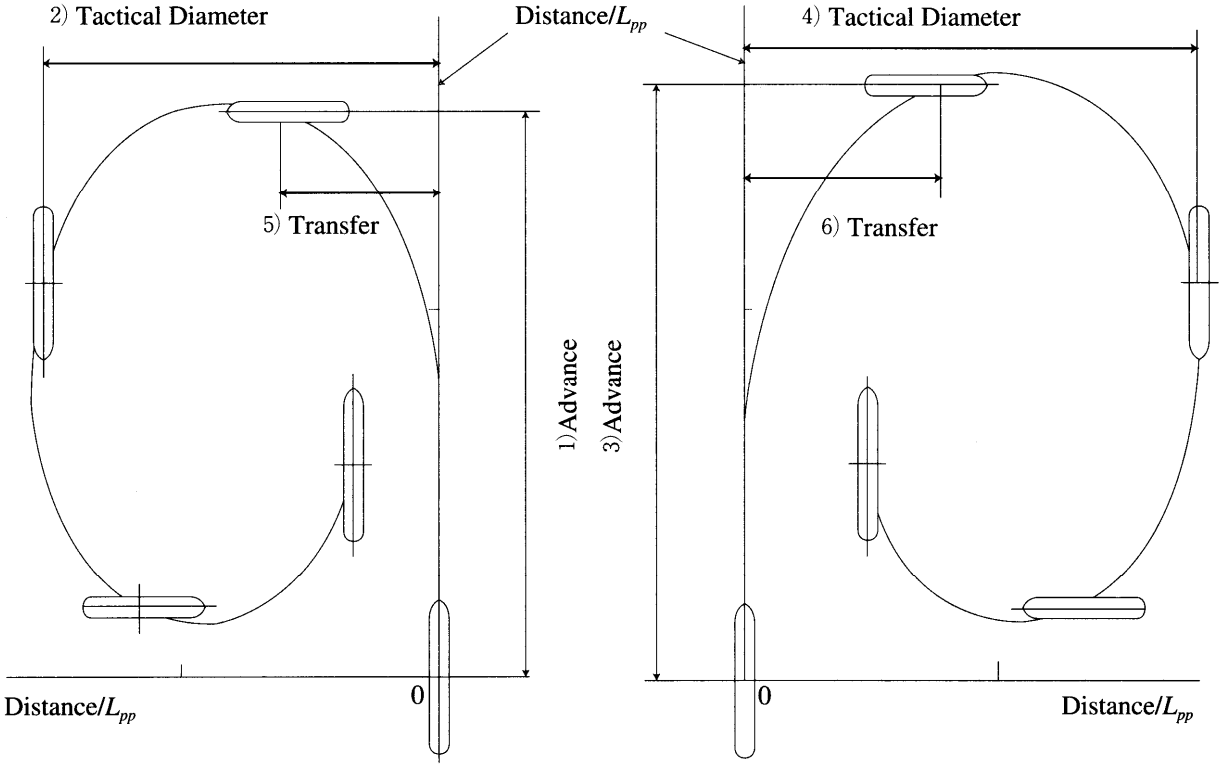
(c) The elapsed time for the ship to turn 360 *degrees* (where the ship continues on for a 720-*degree* turn, separate times for each 360-*degree* turn)

(d) Number of main engine revolutions at the beginning and the end of the test

(2) A figure indicating the ship track as shown in **Fig. An 1.4.2** and the measurement items

specified in **(1)** are to be reported in the results of the sea trial. The distances shown in the figure are to be measured in ship-lengths.

Fig. An1.4.2 Turning Test



An 1.4.3 Stopping Test

1 General

The stopping test is a test to verify the ship's stopping ability.

2 Testing Method

(1) While the ship is running ahead at test speed, an order for full astern is issued, and the reversing operation from ahead run to full astern run is carried out as soon as possible. The test is continued until the speed of the ship against the water has become 0.

(2) The rudder is to be kept at the mid position during the test.

3 Measurement Method

(1) The ship speed, heading angle and the ship track are to be measured at constant intervals.

(2) Where a DGPS or doppler log is used for the measurement, this equipment is to be appropriately calibrated, and the ship's position and ship speed are to be measured at constant intervals.

4 Measurement Items and Report

(1) The following items are to be measured. (*See* **Fig. An 1.4.3**)

(a) Ship speed at the beginning of the test

(b) Number of main engine revolutions at the beginning, at the time when the full astern is ordered, and at the end of the test

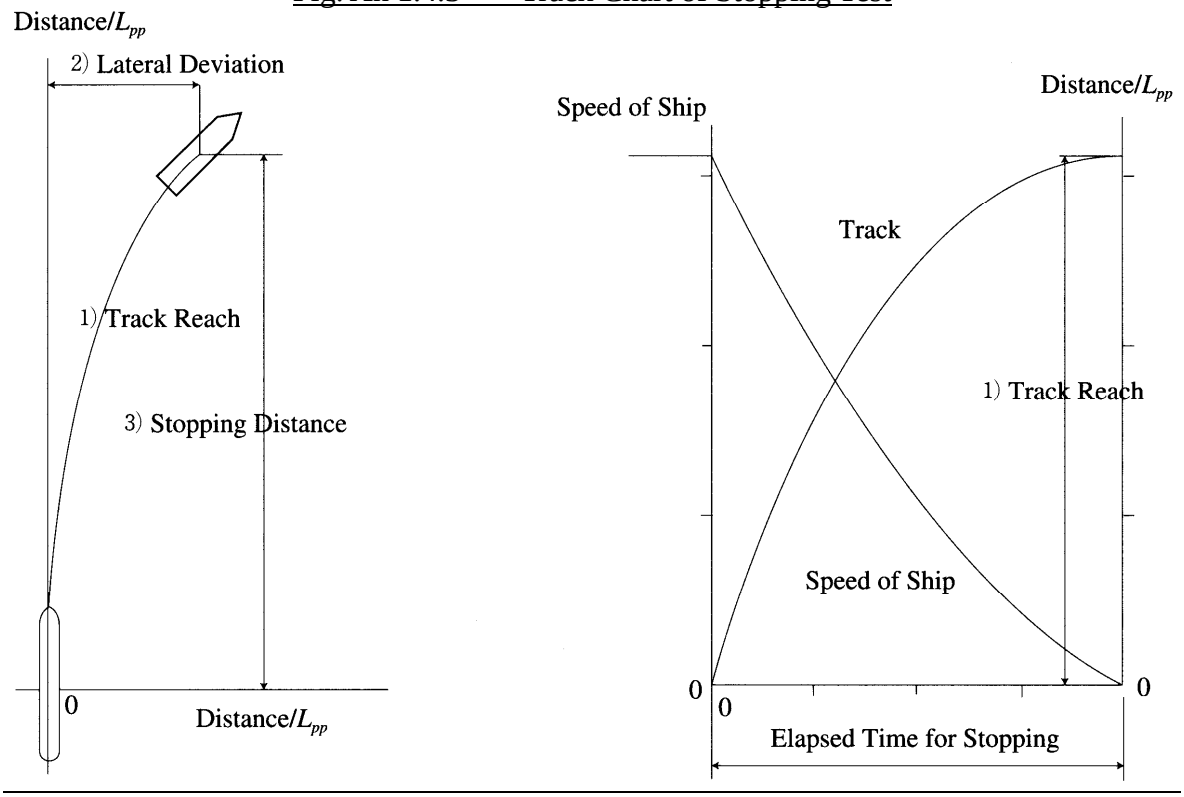
(c) Track reach (1) in the Figure), stopping distance (3) in Figure), lateral deviation (2) in the Figure) and change of ship speed at constant intervals

(d) The elapsed time for the ship to stop after the full astern order

(2) A figure indicating the ship track as shown in **Fig. An 1.4.3** and the measurement items

specified in **(1)** are to be reported in the results of the sea trial. The distances shown in the figure are to be measured in ship-lengths.

Fig. An 1.4.3 Track Chart of Stopping Test



An 1.4.4 Initial Turning Test

1 General

(1) The initial turning test is a test to verify the ship's initial turning ability.

(2) This test includes both right turning and left turning tests.

(3) This test may be conducted at the 10/10-*degrees* zigzag test specified in **An 1.4.5**.

2 Testing Method

(1) While the ship is running ahead at test speed, the rudder angle is changed 10 *degrees* to one side. This rudder angle is kept until the ship turns 10 *degrees* from the original course.

(2) Where this test is conducted as part of the 10/10-*degrees* zigzag test, the testing method is to be in accordance with **An 1.4.5**.

3 Measurement Method

(1) The ship speed, heading angle and number of main engine revolutions are to be measured at constant intervals, as are the elapsed time and distance travelled by the ship to change its heading to 10 *degrees* from the original course.

(2) Where a DGPS or doppler log is used for measurement, this equipment is to be appropriately calibrated, and the ship's position and speed are to be measured at constant intervals.

4 Measurement Items and Report

(1) The following items are to be measured. (*See* **Fig. An 1.4.5**)

(a) Ship speed at the beginning and the end of the test

(b) Number of main engine revolutions at the beginning and the end of the test

(c) Travelling distance from the original course

(d) The elapsed time (t_{a1} in **Fig. An 1.4.5**) for the ship's heading angle to change 10 *degrees*

from the original course.

(2) A figure indicating the ship track as shown in **Fig. An 1.4.5** and measurement items specified in **(1)** above are to be reported in the results of the sea trial. However, where this test is conducted as a part of the 10/10-*degree* zigzag test specified in **An 1.4.5**, this figure indicating the ship track may be dispensed with.

An 1.4.5 Zigzag Test

1 General

(1) The zigzag test is a test to verify the ship's yaw checking and course keeping ability.

(2) This test includes both right turning and left turning tests.

(3) This test consists of the 10/10-*degrees* zigzag test and the 20/20-*degrees* zigzag test.

2 Testing Method

(1) The 10/10-*degrees* zigzag test

The 10/10-*degrees* zigzag test is carried out as follows:

(a) While the ship is running ahead at test speed, the rudder angle is changed to 10 *degrees* starboard (or port).

(b) When the ship's heading reaches 10 *degrees* starboard (or port) from the original course, the rudder angle is changed to 10 *degrees* port (or starboard).

(c) When the ship's heading reaches 10 *degrees* port (or starboard) from the original course, the rudder angle is changed to 10 *degrees* starboard (or port).

(d) The ship is returned to its original course.

(2) The 20/20-*degrees* zigzag test

The 20/20-*degrees* zigzag test is carried out as follows:

(a) While the ship is running ahead at test speed, the rudder angle is changed to 20 *degrees* starboard (or port).

(b) When the ship's heading reaches 20 *degrees* to starboard (or port) from the original course, the rudder angle is changed to 20 *degrees* port (or starboard).

(c) The ship is returned to its original course.

3 Measurement Method

(1) The ship speed, heading angle and number of main engine revolutions are to be measured at constant intervals, as are the elapsed time and distance travelled for the ship to change its heading to 10 *degrees* from the original course.

(2) Where a DGPS or doppler log is used for measurement, this equipment is to be appropriately calibrated, and the ship's position and speed are to be measured at constant intervals.

4 Measurement Items and Report

(1) The following items for the 10/10-*degrees* zigzag test are to be measured. (*See* **Fig. An 1.4.5**)

(a) Ship speed at the beginning and the end of the test

(b) Number of main engine revolutions at the beginning and the end of the test

(c) Elapsed time (t_{a1} and t_{a2} in the Figure) and distance travelled for the ship to change its heading to 10 *degrees* from the original course

(d) 1st overshoot angle (1) in the Figure)

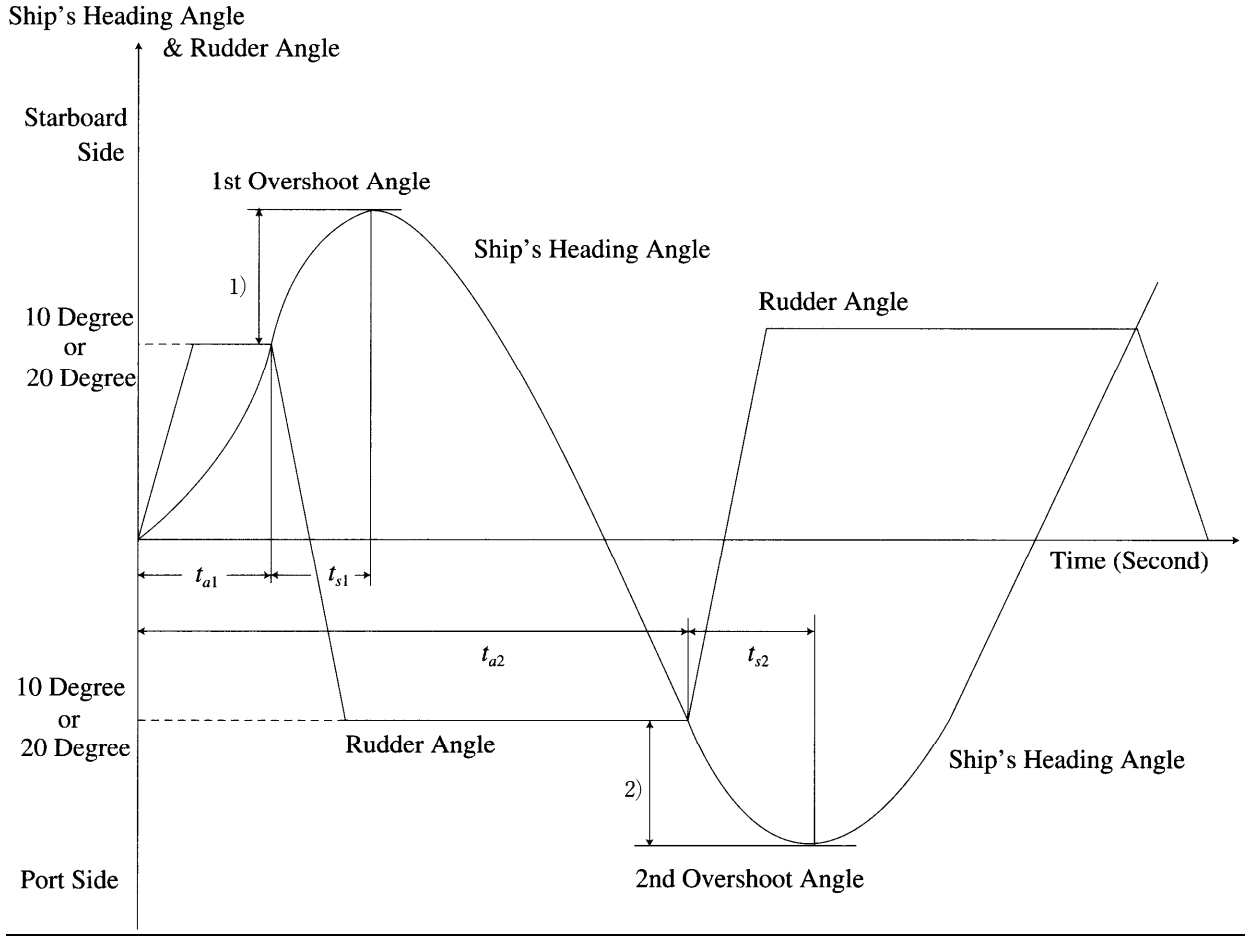
(e) Elapsed time (t_{s1} and t_{s2} in the Figure) from when the ship overshoots the10 *degree* heading until when the ship starts turning in the opposite direction.

(f) 2nd overshoot angle (2) in the Figure)

(2) In the 20/20-*degrees* zigzag test, measurement items specified in **(1)** are to be read 20-*degrees* instead of 10-*degrees*, except **(1)(f)**.

(3) A figure indicating the time history of rudder angle and ship's heading as shown in **Fig. An 1.4.5** and measurement items specified in **(1)** and **(2)** are to be reported in the results of the sea trial.

Fig. An 1.4.5 Zigzag Test



An 1.4.6 Other Manoeuvrability Tests

1 Other Manoeuvrability Tests

When other manoeuvrability tests as shown in **An 5** "Other Manoeuvring Tests" are carried out, test items and their result are to be reported in the results of the sea trial.

An 1.4.7 Correction

1 Correction

(1) Where the manoeuvrability tests specified in **An 1.4.2** to **An 1.4.6** are not carried out under standard conditions, test results may be corrected to those corresponding to the standard conditions using the correcting method specified in **An 4**.

(2) Where deemed necessary, the results may be corrected by an appropriate method considering the effects of wind, waves or currents. For correction of the results of the turning test, a standard correcting method is shown in **An 4**.

(3) For correction of the results of tests other than turning tests, the results are to be corrected by appropriate methods such as computer calculation using a mathematical model, model experiments, and by using sufficient data of similar ships. The outline of each method is shown in **An 3**.

(4) Where the test results are corrected, corrected results are to be reported in the results of the sea trial together with the correction method used.

An 1.5 Equipment for Measurement and Record-keeping

An 1.5.1 Equipment for Measurement

1 General

(1) In general, the following equipment is to be used for the measurement of the manoeuvring tests unless otherwise specified by the Society.
- (a) Clock
- (b) Gyro-compass
- (c) Indicator of rate of turn
- (d) Speed Indicator
- (e) Indicator of positioning (DGPS, doppler log, etc.)
- (f) Rudder angle indicator
- (g) Propeller revolution indicator
- (h) Indicator of propeller pitch
- (i) Wind meter

(2) The equipment specified in **(1)** above is to be capable of measuring as continuously as possible. Where a measurement can be taken at least once every 20 *seconds*, the Society may consider this within the scope of continuous measurement.

(3) The equipment specified in **(1)** above is to have adequate accuracy. Navigational equipment approved by the Administration for measurement may be considered to have adequate accuracy by the Society.

An 1.5.2 Record-keeping

1 Records

Measured data is to be recorded continuously and kept available for when requested.

An 2 Standards for Ship Manoeuvrability

An 2.1 Scope

An 2.1.1 General

1 This requirement is based upon *IMO Res. MSC.* 137(76) “STANDARDS FOR SHIP MANOEUVRABILITY” adopted on 4 December 2002.

2 Standards for ship manoeuvrability shown in this Appendix are based on the standard conditions defined in **An 1.1.1-8**.

3 Standards for ship manoeuvrability shown in this requirement are for ships carrying dangerous chemicals in bulk, ships carrying liquefied gasses in bulk and ships of not less than 100 *m* in length.

An 2.2 Standards for Ship Manoeuvrability

An 2.2.1 Turning Ability

The tactical diameter is not to exceed 5*L*.

The advance is not to exceed 4.5*L*.

An 2.2.2 Stopping Ability

The track reach is not to exceed 15*L*. However, this value may be modified by the Administration where ships of large displacement make this criterion impracticable, but should in no case exceed 20 ship lengths.

An 2.2.3 Initial Turning Ability

Travelling distance is not to exceed 2.5*L*.

An 2.2.4 Yaw Checking and Course Keeping Ability

1 The Overshoot angle for the 10/10-*degrees* zigzag test is not to exceed the value shown in **Table An 2.2.4**.

2 The 1st Overshoot angle for the 20/20-*degrees* zigzag test is not to exceed 25 *degrees*.

Table An 2.2.4 Maximum Value of the Overshoot Angle for the 10/10-*degrees* Zigzag Test

L/*V*	$<10s$	$10s \leq L/V<30s$	$\geq 30s$
1st Overshoot Angle	10 *degrees*	{5+(*L*/*V*)/2} *degrees*	20 *degrees*
2nd Overshoot Angle	25 *degrees*	{17.5+0.75(*L*/*V*)} *degrees*	40 *degrees*

Note:

(1) The following designations are used.

L : length of ship (*m*)

V : test speed (*m/s*)

An 3 Prediction of Ship Manoeuvrability by Model Tests and Computer Calculation Using Mathematical Model

An 3.1 Scope

An 3.1.1 General

1 This Appendix gives the outline of the prediction of ship manoeuvrability by model tests and computer calculation using mathematical models.

2 The prediction method for ship manoeuvrability by model tests and computer calculation using mathematical models is to be submitted to the Society in order to demonstrate the effectiveness and accuracy.

An 3.2 Prediction Method

An 3.2.1 General

The prediction method of ship manoeuvrability may be based on the following **(1)** to **(4)**.

(1) Method based upon experience and existing data, assuming that the manoeuvring characteristics of the new ship will be close to those of similar existing ships

(2) Method based upon the results from model tests

(3) Method based upon the prediction by computer calculation using mathematical models

(4) Method combining **(1)** to **(3)**

An 3.3 Prediction Method based upon the Results from Model Tests

An 3.3.1 General

1 The model tests are to incorporate the standard conditions of the full scale ship as defined in **An 1.1.1-8**.

2 Scale effects are to be considered by an appropriate means.

3 The ship manoeuvrability predicted by the model test is to be verified partly or wholly by a full scale test.

4 Model tests include manoeuvring tests with a free-running model and a captive model.

An 3.3.2 Manoeuvring Test with Free-running Model

The manoeuvring test with a free-running model is a model test that is conducted in a large-sized rectangular tank, a wide towing tank or a still lake, using a model to imitate the manoeuvres performed by a full scale ship in order to predict the manoeuvring characteristics either directly or by considering scaled effects.

An 3.3.3 Manoeuvring Test with Captive Model

The manoeuvring test with a captive model is a model test that is conducted in a towing tank or circulated tank using a Planar Motion Mechanism (PMM) system capable of producing any kind of motion by combining static or oscillatory mode of drift and yaw to move a captive model. Factors such as the hydrodynamic forces acting on the ship, rudder force, and propeller thrust are measured and the coefficients necessary for the computer calculation specified in **An 3. 4** are obtained. However, the manoeuvring characteristics of the ship cannot be predicted directly from this test.

An 3.4 Computer Calculation by Using Mathematical Models

An 3.4.1 General

1 A mathematical model is an equation of motion derived from mechanically analysing the manoeuvring motion of the ship. By incorporating the coefficients (obtained from the manoeuvring test with captive model specified in **An 3.3.3**) into the mathematical model, the manoeuvring characteristics can be predicted by making computer calculations with the equation of motion

2 Where the manoeuvring characteristics are predicted by using computer calculations with the mathematical model, the mathematical method, calculation method, and relevant information are to be submitted to the Society.

3 The manoeuvring characteristics predicted by using computer calculations with the mathematical model are to be verified partly or wholly by full scale tests or the manoeuvring test with free-running model specified in **An 3.3.2**.

An 4 Correcting Method of Manoeuvring Test

An 4.1 Scope

An 4.1.1 General

This requirement shows the standard method for correcting the results of tests not carried out in the standard conditions defined in **An 1.1.1-8** and the standard approach to incorporating the

effects of environmental conditions.

An 4.2 Correcting Method

An 4.2.1 Loading Condition

1 General

Where the manoeuvring tests are carried out in non-standard conditions, the manoeuvring characteristics under standard conditions can be estimated by the following methods.

2 Method 1

From the test results of the non-standard condition and the correlation between the results of the standard and non-standard conditions determined by model tests or numerical simulation using the mathematical model, the manoeuvring characteristics in the standard condition of the full scale ship can be estimated by using the following formula.

$$R = T \cdot F/B$$

Where,

B: Estimated manoeuvring characteristics during the sea trial based on the model test or numerical simulation using the mathematical model

F: Estimated manoeuvring characteristics in standard conditions based on the model test or numerical simulation using the mathematical model

T: Manoeuvring characteristics measured during the sea trial

R: Manoeuvring characteristics of the ship in standard conditions

3 Method 2

The manoeuvring characteristics of the ship in the sea trial are estimated by numerical simulation using the mathematical model and the estimates are checked with the actual results of the sea trial in order to ascertain their degree of accuracy. The manoeuvring characteristics of standard conditions may be obtained by means of the same method using the mathematical model.

An 4.2.2 Environmental Conditions

1 General

(1) Ship manoeuvrability can be significantly affected by the immediate environmental such as wind, waves and currents. The test results are to be corrected by a suitable method.

(2) In this section, the correcting method for the results of the turning test under uniform wind, wave, and current conditions is shown.

(3) The results of tests other than the turning test are to be corrected by a suitable method considering the direction of the wind, waves, and current.

2 Correcting method for the results of the turning test

(1) In order to have enough data to correct the results of the turning test, the ship is to complete at least a 720-*degree* turn during the turning test. (*See* **Fig. An 4.2.2**) The ship's track, heading and the elapsed time are to be recorded during the turning test. The data obtained after the ship's heading changes 180 *degrees* is used to estimate magnitude and directions of the current.

(2) If the results of the turning tests are as shown in **Fig. An 4.2.2** due to the effect of wind and current, the following correcting method may be applied.

(a) Where the position (X_{1i}, Y_{1i}) of the ship measured at the heading of *i* degree(s) during the first 360-*degree* turn changes to position (X_{2i}, Y_{2i}) measured at the heading of *i* degree(s) during the second 360-*degree* turn, the local current velocity V_i for any two corresponding positions is defined as follows:

$V_i = (X_{2i} - X_{1i}, Y_{2i} - Y_{1i})/(t_{2i} - t_{1i})$

(b) Mean velocity V_c is obtained from the following by calculating at each point.

$$V_c = \frac{1}{n}\sum_{i=1}^{n} V_i$$

The above vector V_c includes the effects of wind and waves.

(c) All trajectories obtained from the turning test are corrected by using vector V_c as follows:

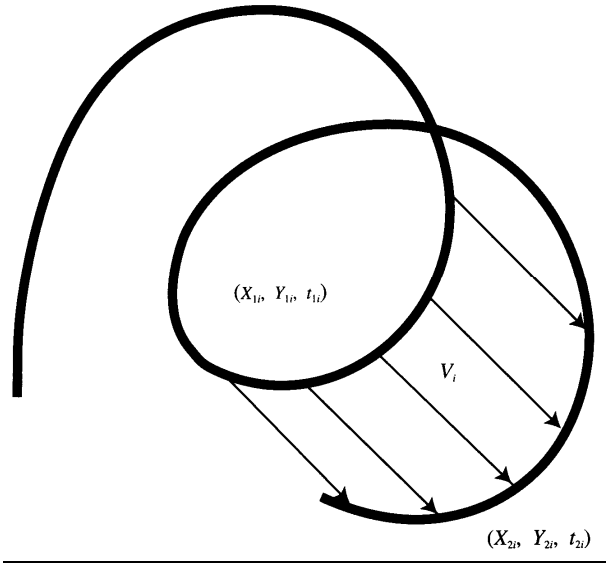
$X'(t) = X(t) - V_c \cdot t$

Where,

$X(t)$ is the measured position vector

$X'(t)$ is the corrected position vector

Fig. An 4.2.2 Trajectory Obtained from the Turning Test



An 5 Other Manoeuvring Tests

An 5.1 Scope

An 5.1.1 General

1 This requirement shows standard manoeuvring tests that supplement the tests specified in **An 1**. Where the ship is found to have instability when changing or keeping course, these tests may be conducted in addition in order to investigate ship manoeuvrability in more detail.

2 Where the manoeuvring tests specified in this requirements are conducted, the test results are to be reported to the Society.

An 5.2 Tests

An 5.2.1 General

1 Spiral manoeuvres test, pull out manoeuvres test, and modified zigzag test are shown in this requirement as supplementary tests.

An 5.2.2 Spiral Manoeuvre Test

1 General

(1) The spiral manoeuvring test is a test to verify the ship's course keeping ability by using the unstable loop width obtained from the yaw rate - rudder angle curve shown in **Fig.An 5.2.2**.

(2) The spiral manoeuvring test includes the direct spiral manoeuvre test, reversed spiral manoeuvre test, and simplified spiral manoeuvre test.

2 Direct Spiral Manoeuvre Test

(1) Testing Method

While the ship is running ahead at test speed, the rudder angle is changed to 15 *degrees* starboard (or port) and held until the yaw rate remains constant for approximately one minute. The rudder angle is then decreased in 5 *degrees* increments, and is held at each increment until a constant yaw rate is obtained.

(2) Measurement Method

At each rudder angle, the ship speed and yaw rate are measured.

(3) Measurement Items and Report

(a) The following items are to be measured.

i) Rudder angle

ii) Ship speed and yaw rate at each rudder angle

iii) Elapsed time for until the yaw rate becomes steady state after the ship is steered.

(b) The yaw rate - rudder angle curve as shown in **Fig. An 5.2.2** and the measurement items specified in **(a)** are to be reported in the results of the sea trials.

3 Reversed Spiral Manoeuvre Test

(1) Testing method

While the ship is running ahead at test speed, the rudder angle is changed to over 15 *degrees* starboard (or port) and held until a constant yaw rate is obtained. A new yaw rate is then selected and the rudder angle is changed accordingly (lesser angle) causing the ship to ease out of the turn slightly. This is repeated until 15 *degrees* port (or starboard) is attained. The mean rudder angle required to produce this yaw rate is measured, and the yaw rate - angle curve is created as shown in **Fig. An 5.2.2**.

(2) Measurement Method

At each specific yaw rate, ship speed and rudder angle are measured.

(3) Measurement Items and Report

(a) The following items are to be measured.

i) Yaw rate

ii) Ship speed and rudder angle at each yaw rate

(b) The yaw rate - rudder angle curve as shown in **Fig. An 5.2.2** and the measurement items specified in **(a)** are to be reported in the results of the sea trials.

4 Simplified Spiral Manoeuvre Test

(1) Testing method

While the ship is running ahead at test speed, the ship is steered to the maximum rudder angle until a constant yaw rate is obtained. The rudder angle is then brought to zero until the yaw rate returns to zero. If the ship returns to zero yaw rate, the ship is stable and the test

may be terminated. If the ship does not return to zero yaw rate, the ship is steered to a half of the following angles in the opposite direction until the yaw rate stabilizes at zero.

(a) $L/V<9$ 0 *degrees*

(b) $9 \leq L/V<45$ $\{-3+1/3 \cdot (L/V)\}$ *degrees*

(c) $L/V \geq 45$ 12 *degrees*

(2) Measurement Method

Yaw rate, ship speed and rudder angle are measured.

(3) Measurement Items and Report

(a) The following items are to be measured.

i) Yaw rate, maximum rudder angle, and ship speed when a constant yaw rate is obtained at the maximum rudder angle

ii) Ship speed and yaw rate when the rudder is returned to the neutral position

iii) Time taken to achieve a constant yaw rate after the rudder is returned to the neutral position

iv) Yaw rate, rudder angle, and ship speed for ships requiring steering in the opposite direction

(b) The yaw rate / rudder angle relation curve and the measurement items specified in **(a)** are to be reported in the results of the sea trials.

An 5.2.3 Pull out Manoeuvre Test

1 Testing method

After the turning test is completed, the rudder angle is returned to zero *degrees*, and held until a steady yaw rate is obtained.

2 Measurement Method

Yaw rate and ship speed are measured at constant intervals.

3 Measurement Items and Report

(1) The following items are to be measured.

(a) Yaw rate at constant intervals

(b) Ship speed and rudder angle

(2) The yaw rate time history curve as shown in **Fig. An 5.2.3** and the measurement items specified in **(1)** are to be reported in the results of the sea trials.

An 5.2.4 Modified Zigzag Test

The modified zigzag test is a modified version of the 10/10-*degrees* zigzag test and 20/20-*degrees* zigzag test specified in **An 1** that is conducted at 10/20-*degrees*. The testing method and measurement items are to be in accordance with **An 1.4.5**.

Fig. An 5.2.2 Spiral Manoeuvre Test

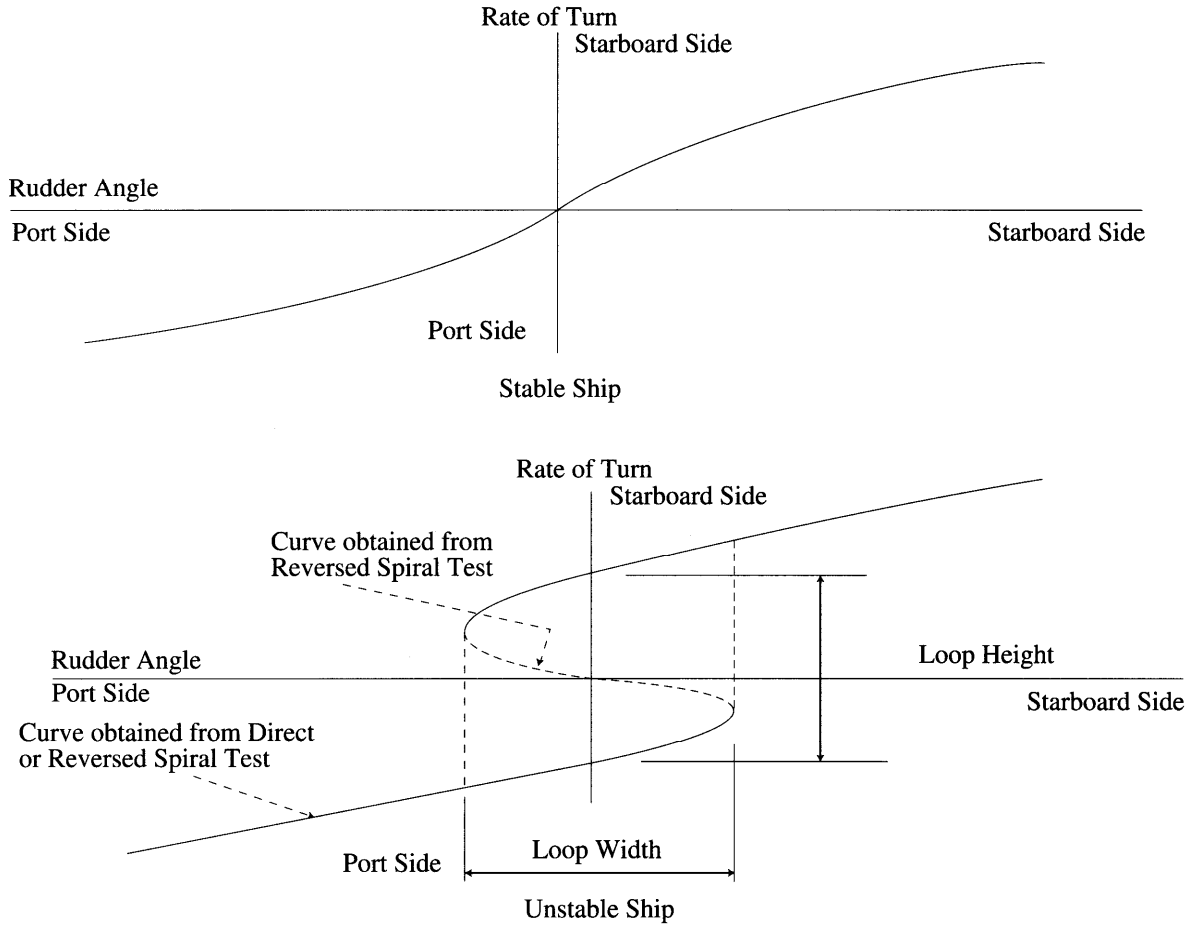
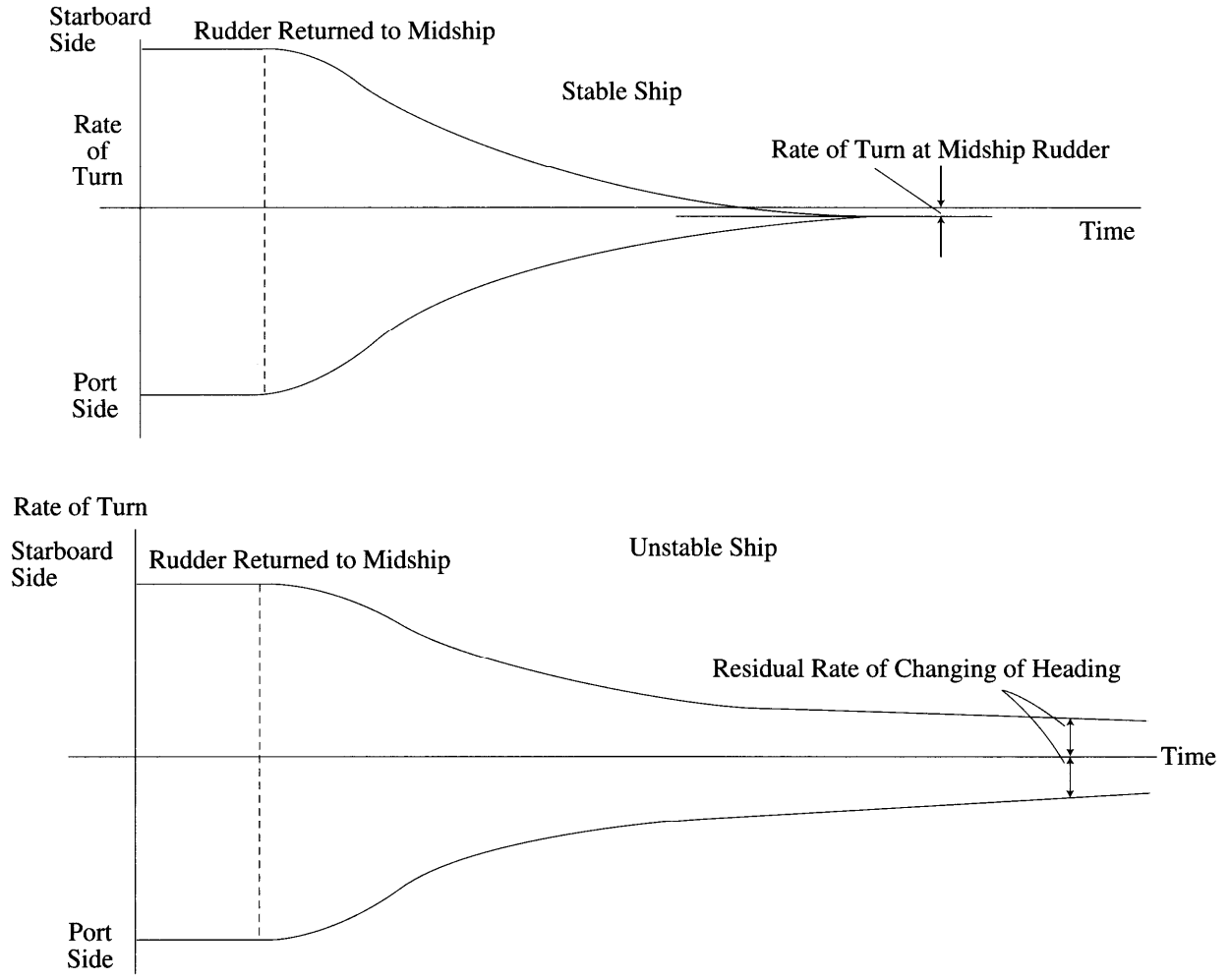


Fig. An 5.2.3 Pull out Manoeuvre Test



Annex 2.3.1-2 has been added as follows.

Annex 2.3.1-2 PROCEDURES FOR ON BOARD NOISE MEASUREMENTS

Chapter 1 GENERAL

An 1.1 General

An 1.1.1 General

1 This Annex is based on the mandatory requirements specified in the *Code on Noise Levels on Board Ships* adopted by *IMO Res. MSC.*337(91) (hereinafter, referred to as "the Code").

2 In addition to the requirements in this annex, recommendatory requirements are stipulated in the Code.

An 1.1.2 Scope

1 This Annex applies to ships of 1,600 *gross tonnage* and upward engaged on international voyages, except in cases where specified by the Administration.

2 Notwithstanding the requirement specified in **-1** above, this Annex does not apply to the following ships:

(1) Fishing vessels
(2) Pipe-laying barges
(3) Crane barge
(4) Mobile offshore drilling units
(5) Ships not propelled by mechanical means
(6) Pile driving vessels
(7) Dredgers

3 In the case of repairs, alterations and modifications of a major character and outfitting related thereto of existing ships, it is to be ensured that areas in which changes have been made are to meet the requirements of this Annex.

4 This Annex does not apply to passenger cabins and other passenger spaces, except in so far as they are work spaces and are covered by the provisions of this Annex. Passenger spaces where they are also occupied by crew such as recreation rooms and open recreation areas are to be considered as "other passenger spaces", and therefore are not subject to this **Annex**. However, bulkhead and decks of crew cabins and hospitals adjacent to such rooms/areas are to have the weighted sound reduction index (*Rw*) in compliance with **An 5.1.1-1**.

5 This Annex covers only noise sources related to the ship such as machinery and propulsion, but does not include wind, wave, ice noise, alarms and public address systems, etc.

An 1.1.3 Dispensation

1 In cases where the requirements in this Annex cannot be complied with and the dispensation from certain requirements is granted by the Administration, the requirements in this Annex need not be satisfied.

2 For ships designed for and employed on voyages of short duration, or on other services involving short periods of operation of the ship, to the satisfaction of the Administration, the noise level limits for accommodation spaces and service spaces in **Table An 4.1** may be applied only with the ship in the port condition.

An 1.2 Definitions

For the purpose of this Annex, the following definitions in **-1** to **-25** are to apply.

1 *Accommodation spaces* are the spaces used for cabins, offices (for carrying out ship's business), hospitals, messrooms, recreation rooms (such as lounges, smoke rooms, cinemas, gymnasiums, libraries and hobbies and games rooms) and open recreation areas to be used by seafarers.

2 *A-weighted equivalent continuous sound level* $L_{Aeq}(T)$ is the A-weighted sound pressure level of a continuous steady sound that, within a measurement time interval, *T*, has the same mean square sound pressure as a sound under consideration which varies with time. It is expressed in decibels *A* (*dB*(*A*)) and is given by the following equation:

$$L_{A_{eqT}} = 10\log\frac{1}{T}\int_0^T \frac{p_a(t)^2}{p_0^2}dt$$

where: T = measurement time

$p_a(t)$ = A-weighted instantaneous sound pressure

p_0 = 20 μPa (the reference level)

3 *A-weighted sound pressure level or noise level* is the quantity measured by a sound level meter in which the frequency response is weighted according to the A-weighting curve (see *IEC* 61672-1).

4 *C-weighted equivalent continuous sound level* $L_{Ceq}(T)$ is the C-weighted sound pressure level of a continuous steady sound that within a measurement time interval, *T*, has the same mean square sound pressure as a sound under consideration which varies with time. It is expressed in decibels *C* (*dB*(*C*)) and is given by the following equation:

$$L_{C_{eqT}} = 10\log\frac{1}{T}\int_0^T \frac{p_c(t)^2}{p_0^2}dt$$

where: T = measurement time

$p_c(t)$ = C-weighted instantaneous sound pressure

p_0 = 20 μPa (the reference level)

5 *C-weighted peak sound level* L_{Cpeak} is the C-weighted maximum instantaneous sound pressure level. It is expressed in decibels C (*dB*(*C*)) and is given by the following equation:

$$L_{Cpeak} = 10\log\frac{P_{peak}^2}{P_0^2}$$

where: P_{peak} = C-weighted maximum instantaneous sound pressure

P_0 = 20 μPa (the reference level).

6 *C-weighted sound pressure level or noise level* is the quantity measured by a sound level meter in which the frequency response is weighted according to the C-weighting curve (see *IEC* 61672-1 (2002-05)).

7 *Crane barge* is a vessel with permanently installed cranes designed principally for lifting operations.

8 *Dredger* is a vessel undertaking operations to excavate bottom sediment, where the vessel has permanently installed excavation equipment.

9 *Duty stations* are those spaces in which the main navigating equipment, the ship's radio or the emergency source of power are located or where the fire recording or fire control equipment is centralized and also those spaces used for galleys, main pantries, stores (except isolated pantries and lockers), mail and specie rooms, workshops other than those forming part of the machinery spaces and similar such spaces.

10 *Fishing vessel* is a vessel used commercially for catching fish, whales, seals, walrus or other living resources of the sea.

11 *Hearing protector* is a device worn to reduce the level of noise reaching the ears. Passive noise-cancelling headsets block noise from reaching the ear. Active noise-cancelling headphones generate a signal that cancels out the ambient noise within the headphone.

12 *Integrating sound level meter* is a sound level meter designed or adapted to measure the level of the mean squared time averaged A-weighted and C-weighted sound pressure.

13 *Machinery spaces* are any space which contains steam or internal-combustion machinery, pumps, air compressors, boilers, oil fuel units, major electrical machinery, oil filling stations, thrusters, refrigerating, stabilizing, steering gear, ventilation and air conditioning machinery, etc., and trunks to such spaces.

14 *Mobile offshore drilling unit* is a vessel capable of engaging in drilling operations for the exploration for, or exploitation of, resources beneath the seabed, such as liquid or gaseous hydrocarbons, sulphur or salt.

15 *Navigating bridge wings* are those parts of the ship's navigating bridge extending towards the ship's sides.

16 *Noise* is the all sound which can result in hearing impairment, or which can be harmful to health or be otherwise dangerous or disruptive.

17 *Noise level*. See A-weighted sound pressure level specified in **-3** above.

18 *Pile driving vessel* is a vessel undertaking operations to install pilings in the seabed.

19 *Pipe-laying barge* is a vessel specifically constructed for, or used in conjunction with, operations associated with the laying of submarine pipelines.

20 *Port condition* is the condition in which all machinery solely required for propulsion is stopped.

21 *Repairs, alterations and modifications of a major character* are means a conversion of a ship which substantially alters the dimensions, carrying capacity or engine power of the ship, which change type of the ship, which otherwise so alters the ship that, if it were a new ship, it would become subject to the relevant provisions.

22 *Sound* means the energy that is transmitted by pressure waves in air or other materials and is the objective cause of the sensation of hearing.

23 *Sound pressure level* L_p is the sound pressure level expressed in decibel (*dB*), of a sound or noise given by the following equation:

$$L_p = 10\log\frac{p^2}{p_0^2}$$

where: p = sound pressure, in Pascal

$p_0 = 20\ \mu Pa$ (the reference level).

24 *Voyages of short duration* is the voyages where the ship is not generally underway for periods long enough for seafarers to require sleep, or long off-duty periods, during the voyages.

25 *Weighted sound reduction index*, R_w, is a single number value expressed in decibels (*dB*) which describes the overall sound insulation performance (in laboratory) of walls, doors or floors provides (see *ISO* 717-1:1997 as amended by 1:2006).

Chapter 2 MEASURING EQUIPMENT

An 2.1 Equipment Specifications

An 2.1.1 Sound Level Meters

Measurement of sound pressure levels is to be carried out using precision integrating sound level meters subject to the requirements of this chapter. Such meters are to be manufactured to *IEC* 61672-1(2002-05) type/class 1 standard as applicable, or to an equivalent standard acceptable to the Society. Class/Type 1 sound level meters manufactured according to *IEC* 651/*IEC* 804 may be used until 1 July 2016.

An 2.1.2 Octave Filter Set

An octave filter set is to conform to *IEC* 61260 (1995) or an equivalent standard acceptable to the Society.

An 2.2 Use of Equipment

An 2.2.1 Calibration

Sound calibrators are to comply with *IEC* 60942 (2003-01) and are to be approved by the manufacturer of the sound level meter used.

An 2.2.2 Check of Measuring Instrument and Calibrator

Calibrator and sound level meter is to be verified at least every two years by a national standard laboratory or a competent laboratory accredited according to *ISO* 17025 (2005) as corrected by (Cor 1:2006).

An 2.2.3 Microphone Wind Screen

A microphone wind screen is to be used when taking readings outside and below deck where there is any substantial air movement. The wind screen is not to affect the measurement level of similar sounds by more than 0.5 *dB*(*A*) in “no wind” conditions.

Chapter 3 MEASUREMENT

An 3.1 General

An 3.1.1 Noise Levels

1 Measurements of the A-weighted equivalent continuous sound level, $L_{Aeq}(T)$ are to be made for the purpose of ensuring compliance with **Table An 4.1**.

2 Measurements of the C-weighted equivalent continuous sound level $L_{Ceq}(T)$ and the C-weighted peak sound level L_{Cpeak} are to be made in spaces where $L_{Aeq}(T)$ exceeds 85 *dB*(*A*) for the purpose of determining appropriate hearing protection according to the *HML* method specified in *ISO* 4869-2:1994.

An 3.2 Personnel Requirements

An 3.2.1 Personnel Taking Measurements

The person conducting measurements is to have knowledge in the field of noise, sound measurements and the handling of the equipment used as well as training concerning the procedures specified in this Annex.

An 3.3 Measurement Conditions

An 3.3.1 Operating Conditions at Sea Trials

Measurements are to be carried out under the following conditions specified in the following **-1** to **-8**. The actual conditions during measurement are to be recorded on the noise survey report.

1 Measurements are to be taken with the ship in the loaded or ballast condition.

2 Measurements are to be taken at a course that is as straight as possible.

3 Measurements are to be taken at normal service speed and no less than 80% of the maximum continuous rating (*MCR*). Controllable pitch and Voith-Schneider propellers, if any, are to be in the normal seagoing position. This does not apply to special ship types and ships with special propulsion and power configurations.

4 All machinery, navigation instruments, radio and radar sets, etc., normally in use at normal seagoing condition and levels, including squelch are to operate throughout the measurement period. However, neither energized fog signals nor helicopter operations are to take place during the taking of these measurements.

5 Measurements in spaces containing emergency diesel engine driven generators, fire pumps or other emergency equipment that would normally be run only in emergency, or for test purposes, are to be taken with the equipment operating. Measurements are not intended for determining compliance with maximum noise level limits in **Table An 4.1**, but as a reference for personal protection of seafarers carrying out maintenance, repair and test activities in such spaces.

6 Mechanical ventilation, heating and air-conditioning equipment are to be in normal operation, taking into account that the capacity is to be in accordance with the design conditions. With respect to the requirement, air conditioning vents are to be kept open during the taking of noise measurements on board, unless they are designed to be kept closed in the normal operating condition.

7 In general, doors and windows are to be closed. With respect to the requirement, closing

devices of ventilation grilles/louvres of cabin doors are to be kept open during the taking of noise measurements on board, unless they are designed to be kept closed in the normal operating condition.

8 Spaces are to be furnished with all necessary equipment. Measurements without soft furnishings may be taken but no allowance is to be made for their absence. Rechecks or follow-up readings may be taken with soft furnishings included.

An 3.3.2 Equipment for Long Periods of Use

1 In cases where stabilizers are provided, measurements are to be taken at positions around such machinery when in operation as well as in adjacent accommodation spaces and duty stations; moreover, such measurements are to be taken to ensure compliance with **Table An 4.1**. For thrusters, etc. which are intended for short temporary use only, measurements are to be taken for reference at 40% thruster power and the ship's speed is to be appropriate for thruster operation.

2 In the case of ships with Dynamical Positioning (DP), which is intended for use under normal working conditions, additional noise measurements at the DP mode, which would approximate station-holding at or above 40% of maximum thruster power for design environmental conditions that the ship operates in, are to be made at control stations, duty stations, and accommodation spaces to ensure that the maximum noise level limits in these spaces are not exceeded. With respect to the requirement, the wording "40% of maximum thruster power" means exactly "40% of maximum" and does not mean "40% of 80% as required by **An 3.3.1-3**".

An 3.3.3 Operating Conditions in Port

Measurements are to be taken in machinery spaces with the machinery operating in the port condition.

An 3.3.4 Environmental Conditions

1 In cases where the water depth is less than five times the draught or if there are large reflecting surfaces in the ship's vicinity, such conditions are to be noted in the noise survey report.

2 Meteorological conditions such as wind and rain as well as sea state are to be such that they do not influence the measurements. Wind force 4 and 1 *m* wave height should not be exceeded. If this cannot be achieved, the actual conditions are to be reported.

3 Care is to be taken to see that noise from extraneous sound sources does not influence the noise level on board the ship at the positions of measurement. If necessary, measured values may be corrected for steady state background noise according to the energy summation principle.

An 3.3.5 Measurement Procedures

1 During noise level measurements, only seafarers necessary for the operation of the ship and persons taking the measurements are to be present in the space concerned.

2 Sound pressure level readings are to be taken in decibels using an A-weighting (*dB*(*A*)) and/or C-weighting (*dB*(*C*)) filter and if necessary also in octave bands between 31.5 and 8,000 *Hz*.

3 The noise level measurements are to be taken over a time period until stable readings are found or at least 15 *seconds*.

4 Readings are to be made only to the nearest decibel. If first decimal of the *dB* reading is 5 or higher, the reading is to be made to nearest higher integer.

An 3.3.6 Determination of Noise Exposure

The noise exposure level of seafarers is to be determined based upon *ISO* 9612:2009.

An 3.3.7 Calibration

The sound level meter is to be calibrated both before and after measurements are taken.

An 3.4 Points of Measurement

An 3.4.1 Points of Measurement

Measurements are to be taken at the following **-1** to **-5**:

1 If not otherwise specified, measurements are to be taken with the microphone at a height of between 1.2 *m* and 1.6 *m* from the deck.

2 The distance between two measurement points is to be at least 2 *m*.

3 In large spaces not containing machinery, measurements are to be taken at intervals not greater than 10 *m* throughout the space including positions of maximum noise level.

4 Measurements are no to be taken closer than 0.5 *m* from the boundaries of a space.

5 Measurements are to be taken at positions where the personnel work, including at communication stations.

An 3.4.2 Duty Stations

The noise level is to be measured at all points where work is carried out. Additional measurements are to be taken in spaces containing duty stations if variations in noise level are thought to occur in the vicinity of the duty stations.

An 3.4.3 Intake and Exhaust Openings

When measuring noise levels, the microphone is, where possible, not to be placed within a 30° angle away from the direction of the gas stream and not less than a distance of 1 *m* from the edge of the intake or exhaust opening of engines, ventilation, air conditioning and cooler systems, and as far as possible from reflecting surfaces.

An 3.5 Measurements in Machinery Spaces

1 Measurements are to be taken at the principal working and control stations of the seafarers in the machinery spaces and in the adjacent control rooms, if any, special attention being paid to telephone locations and to positions where voice communication and audible signals are important.

2 Measurements are not normally to be taken closer than 1 *m* from operating machinery, or from decks, bulkheads or other large surfaces, or from air inlets. Where this is not possible, measurement is to be taken at a position midway between the machinery and adjacent reflecting surface.

3 Measurement is to be made at a height of between 1.2 *m* to 1.6 *m* above the deck, platform or walkway in the following locations.

(1) The following equipment, etc. at a distance of 1 *m* from, and at intervals not greater than 3 *m* around:
   (a) Main turbines or engines at each level
   (b) Main gearing
   (c) Turbo blowers
   (d) Purifiers
   (e) Electrical alternators and generators
   (f) Boiler firing platforms
   (g) Forced and/or induced draught fans
   (h) Compressors

(2) Local control stations and the machinery control rooms

(3) All other locations which would normally be visited during routine inspection, adjustment and maintenance

(4) All normally used access routes at intervals not greater than 10 *m*

(5) Workshops within the machinery space

4 Where the measured sound pressure level in *dB*(*A*) at the intervals specified **-3(1)** above does not vary significantly, it will not be necessary to record each position. However, full measurement at representative positions and at the positions of maximum sound pressure level is to be made and recorded, subject to at least four measurements being recorded at each level.

An 3.6 Measurements in Navigation Spaces

Measurements are to be taken on both navigating bridge wings but are to only be taken when the navigating bridge wing to be measured is on the lee side of the ship.

An 3.7 Measurements in Accommodation Spaces

1 One measurement is to be taken in the middle of the space. The microphone is to be moved slowly horizontally and/or vertically over a distance of 1 *m*. Additional measurements are to be performed at other points if appreciable differences, i.e. greater than 10 *dB*(*A*), in the level of sound inside the room occur.
2 The number of measurement cabins is to be not less than 40% of total number of cabins. Cabins which are obviously affected by noise, i.e. cabins adjacent to machinery or casings, are to be considered in any case.
3 For ships with a large number of crew cabins, such as passenger/cruise ships, it will be acceptable to reduce the number of measurement positions. The selection of cabins to be tested is to be representative for the group of cabins being tested by selecting those cabins in closer proximity to noise sources.
4 On open deck, measurements are to be taken in any areas provided for the purpose of recreation.

An 3.8 Measurements in Normally Unoccupied Spaces

1 Measurements are to be taken in all locations with unusually high noise levels where seafarers may be exposed, even for relatively short periods, and at intermittently used machinery locations.
2 Noise levels need not be measured for normally unoccupied spaces, holds, deck areas and other spaces which are remote from sources of noise. In cargo holds, at least three microphone positions in parts of holds where personnel are likely to carry out work are to be used.

Chapter 4 MAXIMUM ACCEPTABLE SOUND PRESSURE LEVELS

An 4.1 General

Measurement results are not to be more than the noise level limits specified in **Table An 4.1**. In large rooms with many measurement positions the individual positions are to be compared to the limits.

Table An 4.1 Noise Level Limits (Unit: *dB*(*A*))

Designation of rooms and spaces	Ship size	
	1,600 up to 10,000 GT	≥10,000 GT
Work spaces		
Machinery spaces [1]	110	110
Machinery control rooms	75	75
Workshops other than those forming part of machinery spaces	85	85
Non–specified work spaces (other work areas)	85	85
Navigation spaces		
Navigating bridge and chartrooms [2]	65	65
Look-out posts, incl. navigating bridge wings and windows [3]	70	70
Radio rooms [4] (with radio equipment operating but not producing audio signals)	60	60
Radar rooms	65	65
Accommodation spaces		
Cabin and hospitals [5]	60	55
Messrooms	65	60
Recreation rooms	65	60
Open recreation areas (external recreation areas)	75	75
Offices	65	60
Service spaces		
Galleys, without food processing equipment operating	75	75
Serveries and pantries	75	75
Normally unoccupied spaces		
Spaces referred to in section **3.8**	90	90

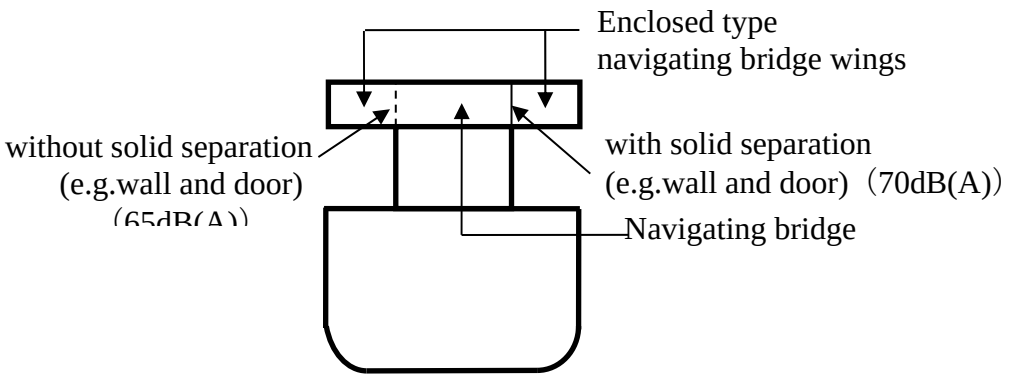
Notes:

1. If the maximum noise levels in **Table An 4.1** are exceeded when machinery is operating, stay is to be limited to very short periods if dispensation is granted by the Administration.
2. A navigating bridge provided with radio equipment is to be regarded as a “navigating bridge”.
3. With respect to the enclosed type navigating bridge wings, navigating bridge wings without solid separation (e.g. wall and door), and those with solid separation (e.g. wall and door) are to be regarded as “navigating bridge” and “navigating bridge wings” respectively. (See **Fig. An 4.1**)
4. “Radio rooms” mean separate rooms dedicated for sending/receiving radio messages.
5. A room consisting of day-room and bedroom is to be regarded as a single “cabin” in cases where the room is for single occupancy.

4.2 Noise Survey Reports

A noise survey report is to be made for each ship. (See **Form 1**) The measuring points are to be marked on a general arrangement plan, or on accommodation drawings and are be identified. The noise survey report is always to be carried on board and be accessible to the crew.

Fig. An 4.1 Noise Levels in Enclosed Type Navigating Bridge



Chapter 5 ACOUSTIC INSULATION BETWEEN ACCOMMODATION SPACES

An 5.1 Sound Insulation Index

An 5.1.1 Bulkheads and Decks

1 The airborne sound insulation properties for bulkheads and decks within accommodation spaces are to comply at least with the following **(1)** to **(4)** weighted sound reduction index (R_w) according to *ISO* Standard 717-1:1996 as amended (1:2006), part 1.

(1) Cabin to cabin: R_w=35

(2) Messrooms, recreation rooms, public spaces and entertainment areas to cabins and hospitals: R_w=45

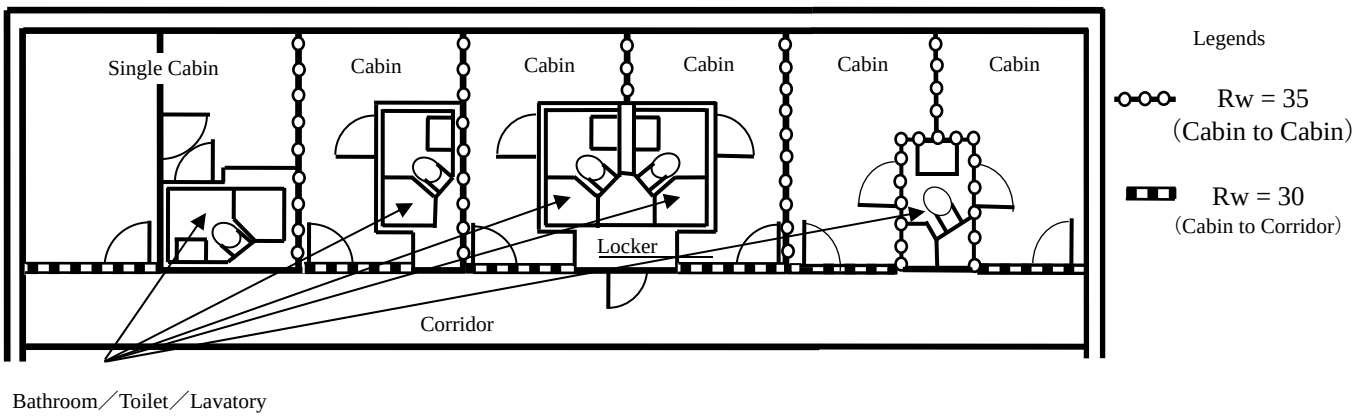
(3) Corridor to cabin: R_w=30

(4) Cabin to cabin with communicating door: R_w=30

2 If a cabin is completely separated by more than one bulkhead from the airborne sound source, the bulkheads are not required to have the airborne sound insulation properties as required in **-1** above. For this purpose, bathrooms, toilets or lavatories are not regarded as cabins, but are regarded as origins of airborne sounds to other cabins. (See **Fig. An 5.1.1**)

3 For a room consisting of a day-room and bedroom for single occupancy, partitions (panels and doors) between the day-room and bedroom need not have the airborne sound insulation properties required in **-1** above.

Fig. An 5.1.1 Arrangement of Cabins



An 5.1.2 Airborne Sound Insulation Properties of Bulkheads and Decks

With respect to the requirement, the airborne sound insulation properties of bulkheads and decks are to comply with the following **(1)** to **(4)**:

(1) The requirements regarding airborne sound insulation properties for bulkheads are to apply to components installed in bulkheads (e.g., cabin doors).

(2) In cases of bulkheads consisting of acoustic insulation panels and doors, each component forming the surface of the bulkhead (acoustic insulation panels and doors, etc.) is to have at least the required R_w in **An 5.1.1-1**.

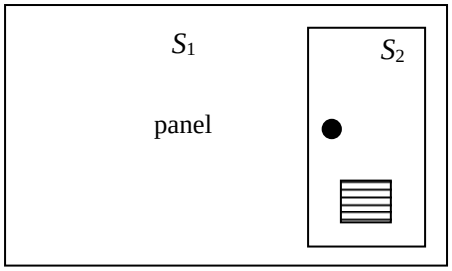
(3) Notwithstanding **(2)** above, in cases where either acoustic insulation panels or doors forming parts of bulkheads have a weighted sound reduction index inferior to that required by **An**

5.1.1-1, this requirement is considered satisfied provided that the R_w of the bulkheads is not inferior to their required values, i.e. the R_w of the bulkhead calculated using both the airborne sound insulation properties of the doors and those of the panels is not inferior to the required value. As guidance on evaluation of the R_w of bulkheads, the following formulae can be used:

$$R = 10\log_{10}\left[S / \sum_{i=1}^{n} (S_i \cdot 10^{-R_i/10})\right]$$

S: Area of the concerned bulkhead
n: Number of components forming the concerned bulkhead
R_i: Sound reduction index of the i-th component (Note: R_i has frequency elements in the frequency range from 100 to 5,000 *Hz*)
S_i: Area of the i-th component

Fig. An 5.1.2 Acoustic Insulation Panels and Doors Forming Parts of Bulkheads



n = 2
S_1: Area of the panel
S_2: Area of the door
S : Area of concerned bulkhead ($S = S_1 + S_2$)
R_1: Sound reduction index of the panel
R_2: Sound reduction index of the door

(4) The requirements regarding airborne sound insulation properties for decks are to apply to decks together with their coverings. However, they need not apply to ceiling panels.

An 5.2 Measurements of Airborne Sound Insulation Properties

1 Materials used to comply with the requirements of **An 5.1** are to be one of the following **(1)** to **(3)**:
(1) Materials whose airborne sound insulation properties are determined by laboratory tests in accordance with *ISO* 10140-2:2010 and approved by the Administration;
(2) Materials which are approved by the Society in accordance with **Chapter 6, Part 4 of the GUIDANCE FOR THE APPROVAL AND TYPE APPROVAL OF MATERIALS AND EQUIPMENT FOR MARINE USE**; or
(3) Materials whose airborne sound insulation properties are determined by laboratory tests in accordance with *ISO* 10140-2:2010 and deemed equivalent to those listed in **(1)** or **(2)** above.

2 With respect to the tests in accordance with *ISO* 10140-2:2010, the following **(1)** to **(3)** apply:
(1) Coverings are to be tested in laboratory as in the onboard arrangement;
(2) Closing devices of ventilation grilles/louvres of cabin doors are to be kept open during laboratory tests; and
(3) Doors are to be tested together with the associated door frame. In cases where there is no sill being part of the door frame, the doors are to be tested with the gap specified by manufacturers and with sealing materials, if fitted.

Chapter 6 HEARING PROTECTION AND WARNING INFORMATION

An 6.1 General

Hearing protectors in accordance with **An 6.2** are to be provided on ships which have spaces with nominal noise levels greater than 85 *dB*(*A*) to seafarers who are required to enter such spaces on an individual basis.

An 6.2 Requirements for Hearing Protectors

Hearing protectors are to be of a type such that they can reduce sound pressure levels to 85 *dB*(*A*) or less. Selection of suitable hearing protectors is to be in accordance with the *HML* method described in *ISO* 4869-2:1994. Noise cancelling technology may be used if the headsets have equivalent performance to hearing protectors in their unpowered condition.

An 6.3 Warning Notices

Where the noise level in machinery spaces or other spaces is greater than 85 *dB*(*A*), entrances to such spaces are to carry a warning notice comprising symbol and supplementary sign in the working language of the ship (See **Table An 6.1** and **Fig. An 6.1**). If only a minor portion of the space has such noise levels, the particular location(s) or equipment is to be identified at eye level, visible from each direction of access.

Table An 6.1 Examples of Warning Notices (Signs)

Signs at the entrances to noisy rooms	
80-85 *dB*(*A*)	HIGH-NOISE LEVEL – USE HEARING PROTECTORS
85-110 *dB*(*A*)	DANGEROUS NOISE – USE OF HEARING PROTECTORS MANDATORY
110-115 *dB*(*A*)	CAUTION: DANGEROUS NOISE – USE OF HEARING PROTECTORS MANDATORY – SHORT STAY ONLY
>115 *dB*(*A*)	CAUTION: EXCESSIVELY HIGH-NOISE LEVEL – USE OF HEARING PROTECTORS MANDATORY – NO STAY LONGER THAN 10 MINUTES

Fig. An 6.1 Examples of Warning Notices (Symbols)

Form 1 NOISE SURVEY REPORT

The following items are to be included in the noise survey report.

1 Ship Particulars

1.1 Name of ship
1.2 Port of registry
1.3 Name and address of shipowner, managing owner or agent
1.4 Name and address of shipbuilder
1.5 Place of build
1.6 IMO number
1.7 Gross tonnage
1.8 Type of ship
1.9 Ship's dimensions – length, breadth, depth, maximum draught (summer load line)
1.10 Displacement at maximum draught
1.11 Date of keel laying
1.12 Date of delivery

2 Machinery Particulars

2.1 Propulsion machinery
1 Manufacturer, type, and number of units
2 Maximum cont. rating – power (*kW*)
3 Normal designed service shaft speed (*rpm*)
4 Normal service rating – power(*kW*)
2.2 Auxiliary diesel engines
1 Manufacturer, and type
2 Output (*kW*), and number of units
2.3 Main reduction gear
2.4 Type of propeller (fixed propeller, controllable pitch propeller, Voith-Schneider propeller)
1 Number of propellers and number of blades
2 Designed propeller shaft speed (*rpm*)
2.5 Other (in the case of special propulsion and power configurations)
2.6 Engine room ventilation
1 Manufacturer, type and number of units
2 Fan diameter (*m*), fan speed (*rpm*) and variable speed (Yes/No)
3 Airflow capacity (m^3/h) and total pressure (*Pa*)

3 Measuring Instrumentation and Personnel

3.1 Instrumentation maker, type and serial No. of sound level meter, microphone, filter, windscreen, calibrator and other equipment
3.2 Calibration of sound level meter (date calibration started/finished)
- at survey by competent authority
3.3 Identification of persons/organizations carrying out measurements

4 Conditions during Measurement

4.1 Date of measurement, start time, and completion time
4.2 Ship's position during measurement
4.3 Loading condition of the ship
4.4 Conditions during measurement
1 Draught forward
2 Draught aft
3 Depth of water under keel
4.5 Weather conditions
1 Wind force
2 Sea state
4.6 Ship speed
4.7 Actual propeller shaft speed (*rpm*)
4.8 Propeller pitch
4.9 Propulsion machinery speed (*rpm*)
4.10 Propulsion machinery power (*kW*)
4.11 Number of propulsion machinery units operating
4.12 Number of diesel auxiliary engines operating
4.13 Number of turbo generators operating
4.14 Engine room ventilation speed mode (high/low/variable)
4.15 Engine load (*%MCR*)
4.16 Other auxiliary equipment operating (Ventilation, heating and air conditioning equipment in operation)

5 Measuring Data

1 Noise limits *dB*(*A*)
Measured sound pressure levels L_{Aeq} *dB*(*A*), L_{Ceq} *dB*(*C*) and L_{Cpeak} *dB*(*C*)
Note: Measurement of sound pressure level L_{Ceq} and L_{Cpeak} is to be done only in the case of exceeding 85*dB*(*A*) and hearing protectors are required.
2 Work spaces
(1) Machinery spaces
(2) Machinery control rooms
(3) Workshops
(4) Non-specified workspaces
3 Navigation spaces
(1) Navigating bridge and chartrooms
(2) Look-out posts, including navigating bridge wings and windows
(3) Radio rooms
(4) Radar rooms
4 Accommodation spaces
(1) Cabins and hospitals
(2) Messrooms
(3) Recreation rooms
(4) Open recreation areas
(5) Offices
5 Service spaces

(1) Galleys, without food processing equipment operating
(2) Serveries and pantries
6 Normally unoccupied spaces

6 Main Noise Abatement Measures (List Measures Taken)

7 Remarks (List Any Exceptions to the Code)

Name, address, place, date and signature of person taking measurements

Annex 2.3.2 has been added as follows.

Annex 2.3.2 GUIDANCE FOR INCLINING TEST

An 1.1 General

An 1.1.1 General

This annex shows the standard method for the inclining test stipulated in **2.3.2-1, Part B of the Rules**.

An 1.2 Preparation for the Test

An 1.2.1 Data to be Submitted

The following plans are to be available at the time of the test as necessary.

(1) General arrangement drawing
(2) Tank capacity plan
(3) Hydrostatic curves
(4) Draft marks locations

An 1.2.2 Inclining Test Conditions

1 The ship is to be as near to completion in lightweight condition as possible. Equipment used by the yard on board is to be removed as much as is possible.

2 Prior to the inclining test, lists of all items which are to be added, removed, or relocated are to be prepared. These weights and their locations are to be accurately recorded.

3 The weight of the ship at testing is not to be below 98 percent of the lightweight condition. However, it is not to be in excess of 102 percent excluding the weight of surplus weights, liquid ballast, fuel oil, diesel oil and fresh water. For smaller ships, a greater deviation may be allowed.

4 All objects are to be secured in their regular positions. All weights which may swing or shift are to be secured in their sea stowage position. If more than one sea stowage position is possible, the actual stowage position used during the test is to be recorded.

5 The ship is to be cleared of residues of cargo, tools, debris, scaffolding and snow. Icing of the inner and outer surfaces, the underwater hull included, is not permitted.

6 Bilge water and liquids accumulated on deck are to be removed in order to exclude an influence on measurements.

7 Only persons participating in the inclining test are to be on board the ship during testing.

An 1.2.3 Tank Contents

1 As a rule, all tanks are to be either full or empty. The number of tanks containing liquids is to be kept to a minimum.

2 Soundings and density of liquids are to be measured in tanks containing liquids. Where tanks are partly filled, free surface effect which has an influence on the result of the test is to be estimated from the shape of the tanks.

3 Where tanks are intended to be filled completely, attention is to be paid to the removal of air pockets. All empty tanks are to be adequately dried.

4 All connections between tanks are to be closed.

An 1.2.4 Mooring Arrangements and Environmental Conditions

1 Mooring lines are to be free of any transverse tension when taking readings. No external moments are to be brought upon the ship from mooring lines. If possible, the ship is to be located in a calm, protected area free from external forces.

2 The depth of water under the hull is to be sufficient to ensure that the hull will be entirely free of the bottom even if the ship is inclined, taking into account tide differences, if applicable.

3 The following mooring arrangements are to be referred to as the standard. Moreover, other mooring arrangements may be approved at the discretion of the Society.

(1) A ship is moored by bow and stern lines on both sides of the ship attached at or near the centre-line. Longitudinal mooring lines are to be as long as practicable.

(2) A ship is moored by bow and stern lines on one side only and supplemented by spring lines.

4 Where only a single bow or stern line is used, it is to be confirmed that the ship's freedom of movement is not adversely affecting the results of the experiment.

5 When tidal currents are present, the experiment is to be conducted at or around slack tide as is possible.

6 The ship's gangway is to be in the stowed position and any shore gangway removed during the inclining test. The number of cables and hoses connected to shore are to be as few as possible. Those which are needed are to be slack.

7 To carry out the inclining test under the influence of wind and currents may be permitted, provided the accuracy of the test is assured.

An 1.2.5 Inclining Weights

1 As a rule, not less than four solid weights are to be used for the inclining test. Use of water ballast transfer to incline the ship may be permitted only in cases where it is impracticable to incline the ship using solid weights. However, the procedure is to be submitted to the Society for approval prior to commencement.

2 The solid weights are to be heavy enough to comply with the requirements in **An 1.3.3-1**. Each solid weight is to be almost equal in mass.

3 Each weight is to be compact, impervious to water. Its centre of gravity is to be accurately determined.

4 Each inclining weight is to be marked with an identification number. The inclining weights are to be weighted with a calibrated instrument. In such cases, a report including the identification number, weight, weight measuring date, a instrument and calibration date is to be prepared to show to the Surveyor at the time of the survey.

An 1.2.6 Measuring Devices

1 In general, not less than two measuring devices, one of which is to be a pendulum or a U-tube, are to be used to determine the ship's inclination.

2 Where pendulums are used, the pendulums are normally to be long enough to give a measured deflection, to each side of upright, of at least 100 *mm*, and be suspended at sheltered locations to be protected from the wind.

3 Where U-tubes are used, the arrangement of the U-tube length is to be such as to ensure the accuracy of its readings.

4 Where stabilographs are used, the calibration of the instruments is to be verified to the Surveyor's satisfaction prior to the experiment.

An 1.2.7 Initial Condition and Stability

1 The ship is to be preferably upright prior to inclining. However, an initial list of the ship not exceeding 0.5°is permissible.

2 Initial trim of the ship is not to exceed 1% of the ship's length.

3 The persons conducting the test are to be satisfied that the ship has adequate, positive stability and acceptable allowance of the stress levels during the test.

An 1.3 Inclining Test and Record of Data

An 1.3.1 Accuracy of Data

Measurement of inclining test data is to be as accurate as possible and to the satisfaction of the attending Surveyor.

An 1.3.2 Draught and Water Density Measurements

1 Draught is to be measured at fore, aft and midship draught marks on both sides immediately before the test.

2 The distance from the draught mark (which is used as a reference point) to the base line is to be verified prior to the test.

3 It is to be ensured that no significant changes have occurred to the load condition of the ship during the test.

4 In case of non-coincidence of separate measuring points, additional measurements are to be taken.

5 Water samples are to be taken at a suitable depth away from surface water which could contain rainwater.

An 1.3.3 Weight Shifts

1 Positioning of inclining weights which gives a maximum heeling moment is to result in a minimum heel angle of 1° up to a maximum 4° from upright, depending upon ship type and size. Where it is impracticable to incline the ship above 1° because of factors such as the GoM being too large, the precision of the measurements is to be enhanced taking account of the characteristic and conditions of the ship and the conditions of the test.

2 Procedures for shifting weights are shown in **Table An1.3.3**.

3 The transverse shift distance is to be as great as practicable. The inclining weights are to be positioned symmetrically to the centre line in order to measure the transverse shift distance easily.

4 The inclining weight positions are to be marked on the deck to ensure that consistency in placement is achieved.

An 1.3.4 Measurement of Heel Angle

1 Pendulum or U-tube readings are to be taken on the recording batten or scale by either of the following ways:

(1) On the final stable position of the pendulum or liquid column after stopping of ship motions due to shifting of the inclining weight;

(2) By marking the centre of residual motion about the mean position.

2 When using other devices, angles of inclination are to be recorded according to instructions supplied for each device.

3 Whenever the inclining weights are shifted, the plot of heel angle against heeling moment is to be made. If there is a deviation of points from the straight line passing through the initial position, the deflections and moments are to be checked and corrected prior to the next weight movement.

4 It is to be checked that weights remain on assigned positions and all lines connected to shore remain slack during measurement.

An 1.3.5 Other Relevant Data

1 Where the inclining test is carried out by means of transfer of water, it has to be possible to evaluate accurately the weight and the centre of the shifted liquid in relation to the ship's heel and

trim.

2 The weather conditions, i.e., wind speed and direction relative to the ship, sea state, air and water temperatures, etc., during the test are to be recorded.

An 1.4 Postponement of the Test

If during the course of the inclining test circumstances arise such that the requirements in this chapter are not complied with, the Surveyor may advise the person in charge to postpone the test.

An 1.5 Inclining Test Report

1 The test report containing all the data gathered during the test, the results calculated from this data, and the calculations is to be prepared and submitted to the Society.

2 The Surveyor is to ensure that the data given in the report is consistent with that gathered during the test and to sign the report.

Table An 1.3.3

	Four		Six	
	Port side	Starboard side	Port side	Starboard side
No.0	2, 4	1, 3	2, 4, 6	1, 3, 5
No.1	4	1, 2, 3	4, 6	1, 2, 3, 5
No.2		1, 2, 3, 4		1, 2, 3, 4, 5, 6
No.3	1	2, 3, 4	6	1, 2, 3, 4, 5
No.4	1, 3	2, 4	2, 4, 6	1, 3, 5
No.5	1, 2, 3	4	1, 2, 3, 4, 6	5
No.6	1, 2, 3, 4		1, 2, 3, 4, 5, 6	
No.7	2, 3, 4	1	1, 2, 4, 6	3, 5
No.8	2, 4	1, 3	2, 4, 6	1 ,3, 5

Notes:

(1) The numbers shown in this table show identification number of the weights.

(2) The underlined number indicates the last weight or weight group shifted.

Annex 5.2.7 has been added as follows.

Annex 5.2.7 GUIDANCE ON PRESSURE TESTING OF BOUNDARIES OF CARGO TANKS UNDER DIRECTION OF THE MASTER (in reference to MSC.1/Circ.1502 ANNEX)

An 1 Introduction

An 1.1 This guidance gives information and advice on technical and formal matters related to the required testing of cargo tanks when this is undertaken under direction of the master according to **5.2.7-4, Part B of the Rules**.

An 1.2 Where the ship is in a shipyard or is under attendance of the surveyor, the testing of cargo tanks is to be carried out under the direction, and in the presence, of the surveyor. It is to be noted that all ballast tanks adjacent to cargo tanks are to be tested by the surveyors.

An 2 Objective and applicability

An 2.1 This guidance is prepared as a reference for Administrations, companies, masters and crews in order to facilitate a common understanding of the procedures for testing of cargo tanks when this is undertaken under the direction of the master.

An 2.2 This procedure applies to oil tankers and ships carrying dangerous chemicals in bulk with integral tanks to which the provision of **5.2.7-4, Part B of the Rules** is applicable.

An 3 Testing of cargo tanks

An 3.1 The minimum requirements for cargo tank testing at renewal survey are given in **5.2.7**, **Part B of the Rules**.

An 3.2 Tests of the cargo tanks carried out under this procedure are to be to the satisfaction of the master.

An 3.3 Boundaries of cargo tanks are to be tested with liquid to the highest point that the liquid will rise under service conditions. The minimum scope of bulkheads to be tested is to be in accordance with the requirements in **Table B5.23-1**, **Part B of the Rules**.

An 3.4 Testing of the boundaries of cargo tanks carried out by the ship's crew under the direction of the master may be accepted by the surveyor provided the following conditions are complied with:

.1 a tank testing procedure specifying fill heights, tanks being filled and boundaries being tested has been submitted by the owner and reviewed by the Society prior to the testing being carried out;

.2 there is no record of leakage, distortion or substantial corrosion that would affect the structural integrity of the tank;

.3 the tank testing has been satisfactorily carried out within the renewal survey window not more than three months prior to the date of the survey on which the overall or close-up survey is completed;

.4 the satisfactory results of the testing are recorded in the ship's logbook; and

.5 the internal and external condition of the tanks boundaries and associated structure are found satisfactory by the surveyor at the time of the overall and close-up survey.

An 3.5 "Failed test": where the outcome of tank testing reveals structural damage or leakage, the Society is to be advised with immediate effect, and attendance on board by (an) surveyor arranged.

An 4 Procedure for testing of cargo tanks

An 4.1 In order to comply with the cargo pressure testing requirements, section **An 4.2** or **An 4.3** below is to be completed.

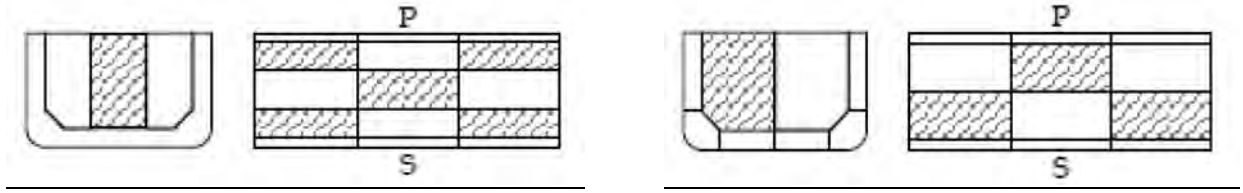
An 4.2 Strength testing using cargo

An 4.2.1 The required pressure testing condition is to be in accordance with the tank testing procedure reviewed by the Society (refer to **5.2.7-4(1), Part B of the Rules**) but not less than the minimum as stated in section **An 3.3** above.

An 4.2.2 In order to test the relevant boundaries, the ship may be loaded in a checkerboard pattern (**Fig. An4.2.2**), so that each cargo tank internal bulkhead is subjected to a fully loaded head of pressure provided that the intended loading and stability conditions are checked and confirmed by the master.

An 4.2.3 The ship's logbook is to confirm that paragraph **An 4.2.2** and section **An 4.3** below have been successfully carried out and that it is to be signed by the master.

Fig. An 4.2.2 - "Stagger test" - checkerboard pattern



Ships with two longitudinal bulkheads Ships with one centreline longitudinal bulkhead

An 4.3 Combined strength and tightness testing using ballast water

If practical with respect to the operation of the ship, it is acceptable to carry out combined strength and tightness testing using ballast water provided the relevant requirements in section **An 4.2** above are complied with and that the relevant tank boundaries are accessible for inspection. The boundaries and associated welds between the tank being tested and adjacent cargo tanks are to be fully inspected to ensure there is no indication of water leakage across the boundaries.

An 4.4 General

Water ballast tanks inclusive boundaries facing the cargo tanks, are to be tested in accordance with **5.2.7**, **Part B of the Rules**. These tests are to be witnessed and all boundaries are to be examined by the surveyor.

An 4.5 Safety

Careful consideration is to be given to the *REVISED RECOMMENDATIONS FOR ENTERING ENCLOSED SPACES ABORD SHIP* (resolution *A.*1050(27)).

An 5 Master's inspections, assessments and reports

An 5.1 General

The following paragraphs describe the operations that are required of the master when carrying out the inspections of the boundaries of the tank which are to be submitted to a hydrostatic test. All safety precautions and facilities (lighting, ventilation, etc.) are to be provided according to the ship's Safety Management System (SMS) documentation and the cargo tank testing procedure as reviewed by the Society.

An 5.2 Places to be inspected

An 5.2.1 All boundaries of the cargo tank under testing are to be examined from positions outside of the cargo tank boundaries. Boundaries of commonly shaped tanks are constituted by the following:

.1 a transverse aft bulkhead and associated structure;

.2 a transverse fore bulkhead and associated structure;

.3 two longitudinal bulkheads and relevant associated structure; and

.4 an inner bottom plating and associate structure.

An 5.2.2 Each of these boundaries is the common division between the cargo tank under testing

and another:

.1 cargo tank, or

.2 ballast tank/double bottom, or

.3 fuel oil tank, or

.4 void space or pump-room.

An 5.2.3 The inspection is to verify that:

.1 the plating and structures of each boundary are not affected by evident geometrical defects, such as deflection/distortion of the structures supporting the plating of the boundaries, when hydrostatically loaded; and

.2 the tightness of each boundary is not impaired, i.e., no leakages are to appear anywhere on surface of each boundary, especially at the welded joints connecting the plates which constitute the boundary itself.

An 5.2.4 Each boundary is to be closely inspected, noting any defective items from the two categories above.

An 5.3 Reporting

An 5.3.1 Following the inspection of all boundaries surrounding the cargo tank being tested, the master is required to report, in a simple manner, the results of the inspection. The report is to be recorded in the ship's logbook and include all data relevant to the following:

.1 identification of the tank subjected to testing;

.2 identification of the compartments surrounding the cargo tank subjected to testing;

.3 date, time and place of testing;

.4 ship's loading condition during the testing, including ship trim; and

.5 outcome of the inspections carried out during the testing.

The report is to be retained on board for the attending surveyor's review.

An 5.3.2 Where no deficiencies have been found or noted, the testing of the cargo tank may be considered as having a satisfactory outcome.

Annex 9.1.3 has been added as follows.

Annex 9.1.3 PROCEDURES FOR THE APPROVAL OF PMS/CBM MANAGEMENT SOFTWARE

An 1.1 General

An 1.1.1 Scope

1 These procedures apply to the tests, examinations, etc. of the computer software required by ships adopting the Planned Machinery Maintenance Scheme (hereinafter referred to as "PMS") or the Condition Based Maintenance Scheme (hereinafter referred to as "CBM") in accordance with the requirements given in **9.1.3-4(5)(f)** or **B9.1.4-5(2)(c) , Part B of the Rules**.

2 The approval of system software developed to manage all internal ship operations is to follow these procedures.

3 The software used on ships which is not subject to CBM need not comply with **An 1.3.3**.

An 1.2 Application for Approval

An 1.2.1 Application Form

Applicants for software approval are to submit an application form (**Form 1**) to the Society.

An 1.2.2 Documents to be Submitted

The documents listed below are to be submitted together with the application form specified in **An 1.2.1**:

(1) Software: 1 set (demonstrational software may be submitted. In cases where a dedicated installer is necessary to install such software, the installer is to be submitted together with the software)

(2) Operation manual which indicates the following contents in detail: 3 sets (1 set of the manual may be submitted in the case of an electronic manual)
  (a) System requirements (central processing unit, operating system, required capacity of the hard disc and memory, etc.)
  (b) Procedure to install and uninstall the software
  (c) Function of the software
  (d) Operating method

(3) Other documents deemed necessary by the Society

An 1.3 Function

An 1.3.1 Planned Maintenance Function

Software is to have the following planned maintenance functions:

(1) It is to be capable of registering the maintenance plans for those survey items required by the machinery maintenance scheme (PMS).

(2) It is to be capable of specifying the time schedule of maintenance or running hours for each item of machinery and equipment including their parts.

(3) It is to be capable of displaying a list of at least the following items. The list is to classify the

registered machinery, equipment and their parts and to be displayed in a tree structure format, etc.

(a) Names of machinery, equipment and their parts
(b) Maintenance items
(c) Maintenance interval (next inspection date or running hour)
(d) Maintenance schedule (It is to be able to directly input the inspection date or calculate from the maintenance interval)
(e) Person in charge of maintenance

(4) Maintenance intervals are not, in principle, to exceed five years. Maintenance intervals are to be capable of being displayed on the list of maintenance within a term which is arbitrarily designated.

(5) In cases where there are maintenance items which expire after the maintenance period, such items are to be easily identified.

An 1.3.2 Maintenance Records Function

The software is to have the following maintenance record functions:

(1) It is to be capable of managing and recording the results of the maintenance conducted by the planned maintenance specified in **An 1.3.1**. The items regarding management and record are to be included the following:

(a) Names of machinery, equipment and their parts
(b) Maintenance items and results (including an exchange of parts)
(c) Maintenance completion date
(d) Total running hour
(e) Next inspection date
(f) Measurement data (including original design dimensions and allowable tolerance) However, such data is only required in cases where measurements are taken.
(g) The condition of damage and the repair method in cases where damage was found.

(2) List of the maintenance items within the designated term is to be displayed. Such lists are to include the name of machinery, equipment and their parts together with the maintenance items and the maintenance completion date.

(3) Past maintenance records are to be displayed in cases where machinery, equipment and their parts are arbitrarily selected.

An 1.3.3 Condition Monitoring Function

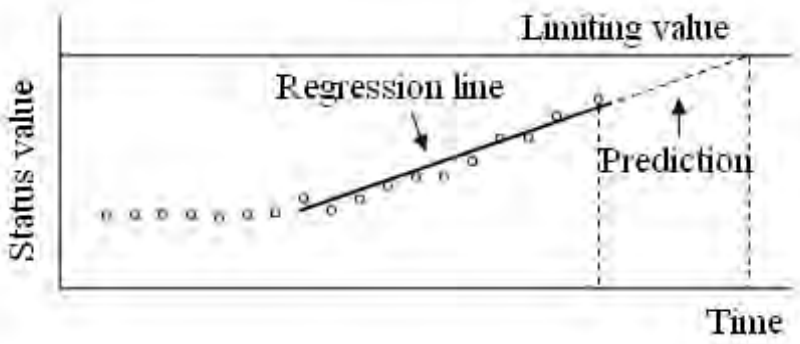
1 The software is to have a function for the condition monitoring of machinery, equipment and their parts as necessary. Such condition monitoring is to be capable of analysis such as trend analysis if necessary. In cases where trend analysis is adopted, the following requirements are to be satisfied:

(1) In cases where measurement data is affected by temperature, running speed, load, etc., the data is to be standardized and trend analysis is to be conducted against the index except in those cases where trend analysis is conducted against measurement data obtained during steady operating conditions.

(2) The limiting parameters of measurement data are to be determined in accordance with the recommended values of the manufacturer or through statistical processing based on baseline data. In cases where such values are determined by the manufacturer through statistical processing, limiting parameters are to be automatically calculated based on accumulated data. However, these values may be determined by other methods deemed appropriate by the Society.

(3) Trends of measurement data together with relevant limiting values are to be able to be displayed by a simple operation. (See **Fig. An 1.3.3**)

Fig. An 1.3.3 Trend Display



2 Software may use diagnostic technology such as complex algorithms, machine learning and statistical knowledge obtained from data from machinery, etc. installed on other ships in order to identify the acceptability of continued service for machinery, equipment and components, or whether maintenance is required. The software need not follow machinery manufacturer recommended maintenance instructions or use manufacturer specified limiting parameters; in such cases, however, the software is to be approved in accordance with machinery manufacturer recommendations, industry standards and its usage history on other ships registered by the Society.

3 Maintenance management based on the condition monitoring specified in **-1** above is to satisfy the following:

(1) Planned maintenance

(a) Machinery, equipment and their parts are to be capable of being registered apart from those which are periodically during open up examination.

(b) The registration of the machinery, equipment and their parts which apply to condition monitoring are to include the following items:

i) Names of machinery, equipment and their parts

ii) Kind of measured signal

iii) Measurement interval

iv) Limiting value (This value is to be set up for each kind of measured signal)

(2) Measuring process and recording

(a) Measurement date and measurement value are to be recorded.

(b) In cases where open up examinations are conducted, it is to be capable of recording the same results of the maintenance specified in **An 1.3.2**.

An 1.4 Administration of Software

An 1.4.1 Administration of Revision

System manufacturers and administers are to handle any software revisions caused by changes in the system. Specific information related to software revisions are to be verified on main displays or menus.

An 1.4.2 Administration of Backup

System manufacturers and administers are to specify proper procedures for backing up administrated maintenance data.

An 1.5 Verification Test

In principle, the Society will conduct verification tests of those functions specified in **An 1.3** after examining the documents specified in **An 1.2**.Verification tests may be conducted under the conditions that the systems are actually used at either the ship management company or onboard the ship. However, in cases where the relevant functions can be verified by the software which has been submitted, verification tests may be omitted.

An 1.6 Approval

An 1.6.1 Notification of Approval

In cases where the documents specified in **An 1.2** and verification test records specified in **An 1.5** are considered appropriate, the Society will approve the issue of a new certificate. In cases where the software has a function specified in **An 1.3.3** or other optional functions, these functions are stated on the certificate.

An 1.6.2 Term of Validity

The term of validity of the "Certificate of Approval" will be 5 *years* from the date of approval. In cases where renewal of approval is carried out in accordance with **An 1.6.3**, the term of validity will be 5 *years* from the next day after the expiration date of the previous period of validity.

An 1.6.3 Renewal of Validity

In the case of renewing validity, manufacturers are to submit the Society an application Form (**Form 1**) along with the previously issued certificate. Changes of specification, if any, are to be described on the application form.

An 1.6.4 Changes in the Contents of Approval

1 In the case of specification changes of approved software, applicants are to submit a "Certificate of Approval" (original) and those documents specified in **An 1.2.2** according to the content of changes together with an application form (**Form 1**).

2 The Society requires the verification test specified in **An 1.5** as necessary.

3 In cases where the documents specified in **-1** and verification test records specified in **-2** are considered appropriate, the Society will issue a new certificate.

4 In cases where approval is given for a design with a partial modification, the expiration date will not be renewed in principle.

An 1.6.5 Revocation of Approval

In cases where any of the following is relevant, the Society may revoke its approval and give notice of such revocation to manufacturers.

(1) In cases where the approval renewal procedures given in **An 1.6.3** were not followed.

(2) In cases where requests for revocation are made by applicants or manufacturers.

(3) In cases where the approved condition was changed without the permission of the Society.

(4) In cases where applicants or manufacturers do not pay approval fees.

Form 1

APPLICATION FOR THE APPROVAL OF PMS/CBM MANAGEMENT SOFTWARE

(☐Initial, ☐Renewal, ☐Modification)

To: Machinery Department, NIPPON KAIJI KYOKAI
4-7, Kioi-cho, Chiyoda-ku, Tokyo 102-8567, JAPAN

Ref. No.:

Date:

Name of Applicant:

Address:

TEL:

FAX:

E-mail:

We hereby apply for the approval of the following software in accordance with the requirements given in Annex B9.1.3-4(5)(f)/B9.1.4-5(2)(c), Part B of the Guidance for the Survey and Construction of Steel Ships.

Name of product	
Revision No.	
Name of Manufacturer and Address of Manufacturer	
Documents Attached	
Note	

Notes:
1. One copy of this application is to be submitted.
2. ☐check where appropriate.

"Guidance for the survey and construction of steel ships" has been partly amended as follows:

Part B CLASS SURVEYS

B2 CLASSIFICATION SURVEYS

B2.1 Classification Survey during Construction

B2.1.2 Submission of Plans and Documents for Approval

Sub-paragraph -9 has been amended as follows.

9 "Airborne sound insulation properties of bulkheads and decks within accommodation spaces" in **2.1.2-1(1)(ac), Part B of the Rules** refers to the weighted sound reduction index (R_w) in **An 5.1**, **Annex ~~B2.3.1-1.(11)~~ 2.3.1-2 "PROCEDURES FOR ON BOARD NOISE MEASUREMENTS"**.

B2.1.4 Presence of Surveyor

2 At the surveys for fire extinguishing systems referred to in **2.1.4-1(15), Part B of the Rules**, the following examinations are to be carried out. Where it is impractical to carry out the examinations on board the ship, the examinations may be replaced with examinations carried out at the place of manufacture under the presence of the Surveyor.

Sub-paragraph (3) has been amended as follows.

(3) For fire extinguishing systems, fire detecting systems and manually operated call points:
((a) to (h) are omitted.)
- (i) Fire detecting system
  - i) Performance tests for one detector of each group ~~(for on-board function tests of fixed fire detection and alarm systems installed in machinery spaces specified in **7.4.1-1**, **Part R of the Rules**, refer to the test procedures shown in **Annex B2.1.4-1(3)(h)i))~~
  - ii) A performance test of the alarm system under loss of power or fault condition
  - iii) The testing of the sample extraction smoke detection systems specified in **30.2.4-2(2)**, **Part R of the Rules**

((j) to (k) are omitted.)

Paragraph B2.1.5 has been amended as follows.

B2.1.5 Hydrostatic Tests, Watertight Tests, and Relevant Tests

~~**1** The tests referred to as "tests deemed appropriate by the Society" in **2.1.5(1), Part B of the Rules** are as follows:~~

~~(1) For ships subject to *SOLAS Convention*, the tests stipulated in *SOLAS Chapter II-1 Regulation 11*, except where specially approved by the Administration; and~~

~~(2) The tests stipulated in the following **(a)** or **(b)**:~~

~~(a) Testing procedures of watertight compartments for ships subject to *SOLAS Convention* (including ships subject to **Part CSR-B&T**) are to be carried out in accordance with **Chapter 1 of Annex B2.1.5-1 "Testing Procedures of Watertight Compartments",**~~

~~unless:~~

~~i) the shipyard provides documentary evidence of the shipowner's agreement to a request to the Flag Administration for an exemption from the application of *SOLAS Chapter II-1*, *Regulation 11*, or for an equivalency agreeing that the content of **Chapter 2 of Annex B2.1.5-1 "Testing Procedures of Watertight Compartments"** is equivalent to *SOLAS Chapter II-1*, *Regulation 11*; and~~

~~ii) the above-mentioned exemption/equivalency has been granted by the responsible Flag Administration.~~

~~(b) Testing procedures of watertight compartments are to be carried out in accordance with **Chapter 2 of Annex B2.1.5-1 "Testing Procedures of Watertight Compartments"** for ships not subject to *SOLAS Convention* and ships subject to *SOLAS Convention* (including ships subject to **Part CSR-B&T**) for which:~~

~~i) the shipyard provides documentary evidence of the shipowner's agreement to a request to the Flag Administration for an exemption from the application of *SOLAS Chapter II-1*, *Regulation 11*, or for an equivalency agreeing that the content of **Chapter 2 of Annex B2.1.5-1 "Testing Procedures of Watertight Compartments"** is equivalent to *SOLAS Chapter II-1*, *Regulation 11*; and~~

~~ii) the above-mentioned exemption/equivalency has been granted by the responsible Flag Administration.~~

~~2~~ With respect to the provisions of **2.1.5(2), Part B of the Rules**, the inert gas supply piping system, after installation, is to be subjected to an airtight test to at least 1.25 times the maximum working pressure of system. However, in cases where pressure relief valves are provided for the system, the airtight test pressure is to be not less than the setting pressure of pressure relief valve.

B2.1.6 Documents to be Maintained On Board

Sub-paragraph -7 has been amended as follows.

7 "Noise survey report" in **2.1.6-1(2)(r), Part B of the Rules** refers to the report in **4.2**, **Annex B2.3.1-1(11) "PROCEDURES FOR ON BOARD NOISE MEASUREMENTS"**. It is recommended that documents containing the noise exposure level determined in accordance with **An3.3.6**, **Annex ~~B2.3.1-1(11)~~2.3.1-2. "PROCEDURES FOR ON BOARD NOISE MEASUREMENTS"** are attached to the "Noise survey report".

B2.3 Sea Trials and Stability Experiments

Paragraph B2.3.1 has been amended as follows.

B2.3.1 Sea Trials

1 (Omitted)

2 The Astern test required by **2.3.1-1(2), Part B of the Rules** is to be carried out in accordance with the following **(1)** to **(43)**.

~~(1) The Astern test is to be carried out in accordance with **(a)** and **(b)** below and the items regarding stopping ability specified in **1.4.3, Annex B2.3.1** "GUIDANCE FOR THE TEST OF SHIP MANOEUVRABILITY" are to be measured.~~

~~(a) While the ship is running ahead at maximum speed, an order for full astern is issued and the reversing operation from ahead run to full astern run is carried out as quickly as possible.~~

~~(b) For ships that are unable to perform the test at maximum speed, the ship is to run ahead at not less than the speed specified in **1.1.2-9, Annex B2.3.1** "GUIDANCE FOR THE~~

~~TEST OF SHIP MANOEUVRABILITY". While the ship is at this speed, an order for full astern is issued and the reversing operation from ahead run to full astern run is carried out as quickly as possible.~~

~~In applying this provision, the tests are to be carried out from all control positions where there are multiple control positions for the reversing operation to astern run.~~

(~~2~~1) It is to be confirmed that the machinery is functioning normally while the ship is running astern. The main engine is to be kept at a rate of more than 70% of the maximum continuous revolutions. The ship is to be kept running astern for the periods specified in **(a)** and **(b)** below corresponding to the type of engine and the performance is to be confirmed in accordance with **1.3.2, Part D of the Rules**.

(a) For ships with main engines other than steam turbines
Until the astern speed (rotational speed in rpm) stabilizes.

(b) For ships with steam turbines
A period of at least 15 *minutes*; the astern trial, however, is to be limited to 30 *minutes* or in accordance with manufacturer's recommendation to avoid overheating of the turbine due to the effects of "windage" and friction.

(~~3~~2) For low pressure (i.e. pressure less than 1 *MPa*) gas-fuelled dual fuel engines, the confirmation specified in **(~~2~~1)(a)** is to be carried out for all operating modes (i.e. the applicable gas mode, diesel mode, etc. specified in **1.4-3 of Annex 4, Part GF** or **1.4-3 of Annex 4, Part N**).

(~~4~~3) To high pressure gas-fuelled dual fuel engines, the requirements for low pressure gas-fuelled dual fuel engines specified in **(~~3~~2)** apply mutatis mutandis.

3 (Omitted)

~~**4** Turning tests required by **2.3.1-1(4), Part B of the Rules** are to be carried out in accordance with **(1)** and **(2)** below.~~

~~(1) A ship is steered to the left or right at the maximum rudder angle (normally 35 *degrees*, however, where a special rudder is provided, a different rudder angle considered appropriate by the Society) while running ahead at the maximum speed, and this rudder angle is to be kept until the ship makes a 360 *degree* circle. The turning ability specified in **1.4.2, Annex B2.3.1** "GUIDANCE FOR THE TEST OF SHIP MANOEUVRABILITY" is to be measured and the ship's stability during the turn is to be confirmed.~~

~~(2) Notwithstanding the requirements in **(1)**, for ships that are unable to perform the test at maximum speed, the ship is to run ahead at not less than the speed specified in **1.1.2-9, Annex B2.3.1** "GUIDANCE FOR THE TEST OF SHIP MANOEUVRABILITY." While the ship is at this speed, the ship is steered to the left or right at the maximum rudder angle (normally 35 *degrees*, however, where a special rudder is provided, a different rudder angle considered appropriate by the Society), and this rudder angle is kept until the ship makes a 360 *degree* circle.~~

~~5~~4 (Omitted)

~~6~~5 (Omitted)

~~7~~6 (Omitted)

~~8~~7 (Omitted)

~~9~~8 (Omitted)

~~10~~9 (Omitted)

~~**11** The noise measurements specified in **2.3.1-1(11), Part B of the Rules** are to be in accordance with **Annex B2.3.1-1.(11) "PROCEDURES FOR ON BOARD NOISE MEASUREMENTS".~~

1~~2~~0 (Omitted)

1~~3~~1 "Tests where deemed necessary by the Society" in **2.3.1-1(13), Part B of the Rules**, refers to the tests and examinations mentioned in the following **(1)** to **(8)**.

((1) to (4) are omitted.)

(5) Sea trials for ships with electrical propulsion plants are to be carried out in accordance with the test procedures deemed appropriate by the Society. For the test of ship manoeuvrability, refer to the test procedures shown in **Annex 2.3.1-1**.

((6) to (8) are omitted.)

1~~4~~2 (Omitted)

1~~5~~3 (Omitted)

1~~6~~4 (Omitted)

Paragraph B2.3.2 has been amended as follows.

B2.3.2 Stability Experiments

1 (Omitted)

~~**2 Annex B2.3.2-2** gives the standard method for inclining tests stipulated in **-1** above.~~

~~3~~2 (Omitted)

~~4~~3 (Omitted)

~~5~~4 (Omitted)

~~6~~5 (Omitted)

~~7~~6 (Omitted)

~~8~~7 (Omitted)

B2.5 Alterations

B2.5.1 Examination of Altered Parts

Sub-paragraph -4 has been amended as follows.

4 In applying the requirements specified in **2.5.1, Part B of the Rules**, the tightness of such boundaries are to be verified by the tests stipulated in **Annex ~~B2.1.5-1~~2.1.5 "Testing Procedures of Watertight Compartments"** in cases where any modifications or repairs have been carried out which affects the tightness of the watertight boundary.

B3 ANNUAL SURVEYS

B3.2 Annual Surveys for Hull, Equipment, Fire Extinction and Fittings

B3.2.1 Examination of Plans and Documents

Sub-paragraph -5 has been amended as follows.

5 "Noise survey report" in **item 11, Table B3.1 in 3.2.1, Part B of the Rules** refers to the report in **An 4.2**, **Annex ~~B2.3.1-1(11)~~2.1.4 "PROCEDURES FOR ON BOARD NOISE MEASUREMENTS"**.

B3.2.2 General Examination

Sub-paragraph -6 has been amended as follows.

6 "Hearing protectors" in item 22, **Table B3.2 in 3.2.1, Part B of the Rules** refers to the hearing protectors in **An 6.1** and **An 6.2**, **Annex ~~B2.3.1-1(11)~~2.1.4 "PROCEDURES FOR ON BOARD NOISE MEASUREMENTS"**.

Paragraph B3.2.3 has been amended as follows.

B3.2.3 Performance Tests

1 The hose test stipulated in items 1 and 2 of **Table B3.3, Part B of the Rules** is to be in accordance with **An1.4.4-3 of Annex ~~B2.1.5-1~~2.1.5 "Testing Procedures of Watertight Compartments"**.

(-2 to -7 are omitted.)

B3.3 Annual Surveys for Machinery

B3.3.2 Performance Tests

Sub-paragraph -5 has been amended as follows.

5 Performance tests of the equipment stipulated in items 7-1(1)(a) and ~~(b)~~(2)(a) of **Table B3.7, Part B of the Rules** may be dispensed with provided the Surveyor is satisfied with the results of the general examination of that equipment.

B3.4 Special Requirements for Ships Carrying Liquefied Gases in Bulk

B3.4.2 Examinations

Sub-paragraph -2 has been amended as follows.

2 In applying item 3(1)(b) of **Table B3.9,** cargo and process piping (including the expansion arrangements, insulation from the hull structure, pressure relief and drainage arrangements, and

water curtain protection as appropriate) are also to be examined.

Sub-paragraphs -7 to -9 have been amended as follows.

7 In applying item 9(1)(c) of **Table B3.9, Part B of the Rules**, examination of the arrangements for the mechanical ventilation of spaces in the cargo area normally entered during cargo handling operations need only be carried out as far as practicable.
8 In applying item 9(1)(g) of **Table B3.9, Part B of the Rules**, it is to be confirmed that any liquid and vapour hoses are suitable for their intended purpose and, where appropriate, type-approved or marked with date of testing.
9 In applying item 9(1)(i) of **Table B3.9, Part B of the Rules**, it is to be confirmed that electrical equipment in hazardous areas is in a satisfactory condition and is being properly maintained.

B3.5 Special Requirements for Ships Carrying Dangerous Chemicals in Bulk

B3.5.2 Examinations

Sub-paragraphs -2 to -6 have been amended as follows.

2 "Alternative examinations considered appropriate by the Society" stipulated in item 8(1)(a) of **Table B3.10, Part B of the Rules** refers to performance tests of cross flooding equipment to confirm whether the equipment is in good working order.
3 In applying item 8(1)(g) of **Table B3.10, Part B of the Rules**, it is to be confirmed that any hoses are suitable for their intended purpose and, where appropriate, type-approved or marked with date of testing.
4 In applying item 8(1)(i) of **Table B3.10, Part B of the Rules**, when applicable, the cargo heating or cooling systems, including any sampling arrangements, are also to be applied in addition to confirming that the means for measuring the temperature and associated alarms are operating satisfactorily.
5 In applying item 8(1)(j) of **Table B3.10, Part B of the Rules**, the following **(1)** and **(2)** are also to be applied.
((1) to (2) are omitted.)
6 In applying item 8(1)(m) of **Table B3.10, Part B of the Rules**, general examination of the arrangements for the ventilation of spaces normally entered during cargo handling operations and other spaces in the cargo area need only be carried out as far as practicable.

B3.6 Special Requirements for Ships Using Low-flashpoint Fuels

B3.6.2 Examinations

Sub-paragraph -2 has been amended as follows.

2 When applying the requirements of ~~(f) of~~ item 9(1)(f) of **Table B3.11, Part B of the Rules**, resistance testing is to be carried out for all electrical bonding to confirm that resistance is not greater than 1 *MΩ* in cases where bonding straps are not provided as electrical bonding between fuel storage tanks or fuel piping and hull structures, or the Surveyor deems such testing to be necessary. However, such measurements may be omitted at the discretion of the Surveyor in cases

where accurate measurement records are maintained and can be verified.

Sub-paragraph -3 has been added as follows.

3 When applying the requirements of item 5(1)(b)ii) of **Table B3.11, Part B of the Rules**, general examinations and performance testing for high level alarms are included functional test specified in **15.4.2-4, Part GF of the Rules**.

B4 INTERMEDIATE SURVEYS

B4.2 Intermediate Surveys for Hull, Equipment, Fire Extinction and Fittings

Sub-paragraph -2 has been amended as follows.

2 The hose test stipulated in items 2 and 14 of **Table B4.1**, **Part B of the Rules** is to be in accordance with **An1.4.4-3 of Annex ~~B2.1.5-1~~2.1.5 "Testing Procedures of Watertight Compartments"**.

B5 SPECIAL SURVEYS

B5.2 Special Surveys for Hull, Equipment, Fire Extinction and Fittings

B5.2.3 Performance Test

Sub-paragraph -2 has been amended as follows.

2 The hose test stipulated in **5.2.3-2(2)** and **(5)**, **Part B of the Rules** is to be in accordance with **An1.4.4-3**, **Annex ~~B2.1.5-1~~2.1.5 "Testing Procedures of Watertight Compartments"**.

Paragraph B5.2.7 has been amended as follows.

B5.2.7 Pressure Tests

(-1 to -3 are omitted.)

~~**4** With respect to the pressure tests for the cargo tanks of tankers and ships carrying dangerous chemicals in bulk, when pressure tests are conducted in the presence of the Master or any other representative personnel of the ship, such pressure tests may be regarded as the pressure tests required for Special Surveys at the discretion of the Surveyor provided the following **(1)** to **(5)** conditions are complied with. For pressure tests conducted in the presence of the master or any other representative personnel, guidance is specified in **Annex B5.2.7-4.**~~

~~(1) The procedure (including information such as fill heights, the tanks being filled and the bulkheads being tested) for the pressure test has been submitted by the owner and reviewed by the Society prior to the pressure test being carried out.~~

~~(2) There is no record of leakage, distortion or substantial corrosion that would affect the structural integrity of the tank.~~

~~(3) The pressure test has been satisfactorily carried out within special survey window not more than 3 months prior to the date of the survey on which the internal examination or close-up survey is completed.~~

~~(4) The satisfactory results of the pressure test are recorded in the ship's logbook.~~

~~(5) The internal and external condition of the tanks and associated structure are found satisfactory by the Surveyor at the time of the internal examination and close-up survey.~~

~~5~~**4** (Omitted)

B6 DOCKING SURVEYS

B6.1 Docking Surveys

Paragraph B6.1.1 has been amended as follows.

B6.1.1 Surveys in Dry Dock or on Slipway

1 The pressure test stipulated in item 2 of **Table B6.1, Part B of the Rules** refers to that specified in item 13 of **Table An1.4-1**, **Annex ~~B2.1.5-1~~2.1.5 "Testing Procedures of Watertight Compartments"**.

2 (Omitted)

B9 PLANNED MACHINERY SURVEYS

B9.1 Planned Machinery Surveys

B9.1.2 Continuous Machinery Surveys (CMS)

Sub-paragraph -6 has been amended as follows.

6 Confirmatory Survey

In ships deemed by the Society as maintaining their machinery and equipment well, overhaul inspections according to the CMS Program specified in **-3** by the shipowner (or the ship management company) may forgo the open-up examination performed in the presence of Surveyors by conducting the following confirmatory surveys, provided that the machinery and equipment are overhauled as part of the ship's maintenance practices and the records from such overhauls are kept in good order. In this case, the due date of the next open-up examination is 5 *years* from the date of its last overhaul and inspection.

((1) to (2) are omitted.)

(3) Timing of the confirmatory survey

A confirmatory survey is to be carried out no later than the completion date of the first periodical survey (excluding those specified in **(4)** to **(6)** of **1.1.3-1, Part B of the Rules**, hereinafter the same in this **(3)**) on or after the day the item of machinery and equipment intended for the confirmatory survey was overhauled and inspected. Notwithstanding the above, if the shipowner (or the ship management company) applies for a survey, it may be allowed to carry out a confirmatory survey no later than the ~~completion date of the second periodical survey on or after the day the item of machinery and equipment intended for the confirmatory survey was overhauled and inspected, but on or before the due date of the open-up examination~~ following **(a)** or **(b)** whichever is earlier.

(a) Completion date of the second periodical survey on or after the day the item of machinery and equipment intended for the confirmatory survey was overhauled and inspected

(b) The due date of the open-up examination

B9.1.3 Planned Machinery Maintenance Scheme (PMS)

Sub-paragraph -4 has been amended as follows.

4 Approval of PMS

Conditions for approval of PMS are as follows:

((1) to (4) are omitted.)

(5) Computer

Computers used for maintenance management system are to satisfy the following requirements specified in **(a)** through **(f)**:

((a) to (e) are omitted.)

(f) It is recommended that the software is approved in accordance with **Annex ~~B9.1.3-4~~9.1.3 "PROCEDURES FOR APPROVAL OF PMS/CBM MANAGEMENT SOFTWARE"**.

B9.1.4 Condition Based Maintenance Scheme (CBM)

Sub-paragraph -5 has been amended as follows.

5 Approval of CBM

Conditions for approval of CBM are as follows:

(1) (Omitted)

(2) Condition monitoring system

The condition monitoring system is to satisfy the following requirements specified in **(a)** to **(h)**. In cases where this system is modified, that modification is to be approved by the Society.

((a) to (b) are omitted.)

(c) In addition to **(b)**, the software is to have condition monitoring function specified in **Annex ~~B9.1.3-4~~9.1.3 "PROCEDURES FOR APPROVAL OF PMS/CBM MANAGEMENT SOFTWARE"** and be suited to diagnosing any deterioration of machinery, equipment or associated components on the basis of the data from the sensors or centralized machinery monitoring and control systems specified in **(a)**. The software is to be suitable for diagnosing the condition of equipment or its components on the basis of independent or coalesced data, or their trends.

((d) to (h) are omitted.)

(3) Maintenance management system

The maintenance management system is to have the maintenance records function specified in **Annex ~~B9.1.3-4~~9.1.3 "PROCEDURES FOR APPROVAL OF PMS/CBM MANAGEMENT SOFTWARE"**. This function may be incorporated into the condition monitoring system specified in **(2)**.

((4) to (7) are omitted.)

Annex B2.1.4-1(3)(h)i) has been deleted.

~~**Annex B2.1.4-1(3)(h)i) PROCEDURES FOR ON-BOARD FUNCTION TEST OF FIXED FIRE DETECTION AND ALARM SYSTEM IN MACHINERY SPACES**~~

(Sections 1.1 to 1.3 are omitted.)

Annex B2.1.5-1 has been deleted.

~~**Annex B2.1.5-1 TESTING PROCEDURES OF WATERTIGHT COMPARTMENTS**~~

(Chapters 1 and 2 are omitted.)

Annex B2.3.1 has been deleted.

~~**Annex B2.3.1 GUIDANCE FOR THE TEST OF SHIP MANOEUVRABILITY**~~

(Sections 1.1 to 1.5 are omitted.)

Annex B2.3.1-1(11) has been deleted.

~~**Annex B2.3.1-1(11) PROCEDURES FOR ON BOARD NOISE MEASUREMENTS**~~

(Chapters 1 and 6 are omitted.)

Annex B2.3.2-2 has been deleted.

~~**Annex B2.3.2-2 GUIDANCE FOR INCLINING TEST**~~

(Sections 1.1 to 1.5 are omitted.)

Annex B5.2.7-4 has been deleted.

~~**Annex B5.2.7-4 GUIDANCE ON PRESSURE TESTING OF BOUNDARIES OF CARGO TANKS UNDER DIRECTION OF THE MASTER (in reference to MSC.1/Circ.1502 ANNEX)**~~

(Sections 1 to 5 are omitted.)

Annex B9.1.3-4 has been deleted.

~~**Annex B9.1.3-4　PROCEDURES FOR THE APPROVAL OF PMS/CBM MANAGEMENT SOFTWARE**~~

(Sections 1.1 to 1.6 are omitted.)

Appendix 1 has been deleted.

~~**Appendix 1　STANDARDS FOR SHIP MANOEUVRABILITY**~~

(Sections 1.1 to 1.2 are omitted.)

Appendix 2 has been deleted.

~~**Appendix 2　PREDICTION OF SHIP MANOEUVRABILITY BY MODEL TESTS AND COMPUTER CALCULATION USING MATHEMATICAL MODELS**~~

(Sections 1.1 to 1.4 are omitted.)

Appendix 3 has been deleted.

~~**Appendix 3　CORRECTING METHOD OF MANOEUVRING TEST**~~

(Sections 1.1 to 1.2 are omitted.)

Appendix 4 has been deleted.

~~**Appendix 4　OTHER MANOEUVRING TESTS**~~

(Sections 1.1 to 1.2 are omitted.)